

150692

SFUND-2001-0009-0012

## HRS DOCUMENTATION RECORD COVER SHEET

**Name of Site:** Sauget Area 2  
**EPA ID No.** ILD000605790

### Contact Persons

Site Investigation: Ken Corkill  
Illinois EPA

Documentation Record: Julia Barr  
DynCorp

### Pathways, Components, or Threats Not Scored

The air migration pathway was not scored because of the lack of documented releases to air. This pathway would not significantly add to the site score.

The ground water migration pathway was not scored, even though there is an observed release to the aquifer, because there are few people using the water for a drinking water supply.

The soil exposure pathway was not scored because of the lack of a large number of documented targets. This pathway would not significantly add to the site score.

Sauget Area 2

## HRS DOCUMENTATION RECORD

Name of Site: Sauget Area 2

EPA Region: 5

Date Prepared: 6/05/2001

Street Address of Site: Monsanto Avenue

City, County, State: Sauget, St. Clair County, Illinois

General Location in the State: East bank of Mississippi River, Southwest Illinois

Topographic Map: Cahokia, IL-MO 1998 (Ref. 3)

Latitude: 38° 35' 50.5" North

Longitude: 90° 10' 56" West

Reference Point: Intersection of Mobile Street and American Bottom Road (Ref. 4)

### Scores

Air Pathway	Not Scored (NS)
Ground Water Pathway	NS
Soil Exposure Pathway	NS
Surface Water Pathway	100
<b>HRS SITE SCORE</b>	<b>50.00</b>

## WORKSHEET FOR COMPUTING HRS SITE SCORE

		<u>S</u>	<u>S<sup>2</sup></u>
1.	Ground Water Migration Pathway Score ( $S_{gw}$ ) (from Table 3-1, line 13)	<u>NS</u>	
2a.	Surface Water Overland/Flood Migration Component (from Table 4-1, line 30)	<u>100</u>	
2b.	Ground Water to Surface Water Migration Component (from Table 4-25, line 28)	<u>100</u>	
2c.	Surface Water Migration Pathway Score ( $S_{sw}$ ) Enter the larger of lines 2a and 2b as the pathway score.	<u>100</u>	<u>10,000</u>
3.	Soil Exposure Pathway Score ( $S_s$ ) (from Table 5-1, line 22)	<u>NS</u>	
4.	Air Migration Pathway Score ( $S_a$ ) (from Table 6-1, line 12)	<u>NS</u>	
5.	Total of $S_{gw}^2 + S_{sw}^2 + S_s^2 + S_a^2$		<u>10,000</u>
6.	<b>HRS Site Score</b> Divide the value on line 5 by 4 and take the square root	<u>50.00</u>	

TABLE 4-1  
SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET

Factor Categories and Factors	Maximum Value	Value Assigned
<b>DRINKING WATER THREAT</b>		
<u>Likelihood of Release</u>		
1. Observed Release	550	<u>550</u>
2. Potential to Release by Overland Flow		
2a. Containment	10	<u>NS</u>
2b. Runoff	25	<u>NS</u>
2c. Distance to Surface Water	25	<u>NS</u>
2d. Potential to Release by Overland Flow (lines 2a x [2b + 2c])	500	<u>NS</u>
3. Potential to Release by Flood		
3a. Containment (Flood)	10	<u>NS</u>
3b. Flood Frequency	50	<u>NS</u>
3c. Potential to Release by Flood (lines 3a x 3b)	500	<u>NS</u>
4. Potential to Release (lines 2d + 3c, subject to a maximum of 500)	500	<u>NS</u>
5. Likelihood of Release (higher of lines 1 and 4)	550	<u>550</u>
<u>Waste Characteristics</u>		
6. Toxicity/Persistence	a	<u>NS</u>
7. Hazardous Waste Quantity	a	<u>NS</u>
8. Waste Characteristics	100	<u>NS</u>
<u>Targets</u>		
9. Nearest Intake	50	<u>NS</u>
10. Population		
10a. Level I Concentrations	b	<u>NS</u>
10b. Level II Concentrations	b	<u>NS</u>
10c. Potential Contamination	b	<u>NS</u>
10d. Population (lines 10a + 10b + 10c)	b	<u>NS</u>
11. Resources	5	<u>NS</u>
12. Targets (lines 9 + 10d + 11)	b	<u>NS</u>
<u>Drinking Water Threat Score</u>		
13. Drinking Water Threat Score ([lines 5 x 8 x 12]/82,500, subject to a maximum of 100)	100	<u>NS</u>

<u>Factor Categories and Factors</u>	<u>Maximum Value</u>	<u>Value Assigned</u>
<b>HUMAN FOOD CHAIN THREAT</b>		
<u>Likelihood of Release</u>		
14. Likelihood of Release (same value as line 5)	550	<u>550</u>
<u>Waste Characteristics</u>		
15. Toxicity/Persistence/Bioaccumulation	a	<u><math>5 \times 10^8</math></u>
16. Hazardous Waste Quantity	a	<u>100</u>
17. Waste Characteristics	1,000	<u>320</u>
<u>Targets</u>		
18. Food Chain Individual	50	<u>45</u>
19. Population		
19a. Level I Concentrations	b	<u>0</u>
19b. Level II Concentrations	b	<u>0.03</u>
19c. Potential Human Food Chain Contamination	b	<u>0</u>
19d. Population (lines 19a + 19b + 19c)	b	<u>0.03</u>
20. Targets (lines 18 + 19d)	b	<u>45.03</u>
<u>Human Food Chain Threat Score</u>		
21. Human Food Chain Threat Score ([lines 14 x 17 x 20]/82,500, subject to a maximum of 100)	100	<u>96.06</u>

<u>Factor Categories and Factors</u>	<u>Maximum Value</u>	<u>Value Assigned</u>
<b>ENVIRONMENTAL THREAT</b>		
<u>Likelihood of Release</u>		
22. Likelihood of Release (same value as line 5)	550	<u>550</u>
<u>Waste Characteristics</u>		
23. Ecosystem Toxicity/Persistence/Bioaccumulation	a	<u><math>5 \times 10^8</math></u>
24. Hazardous Waste Quantity	a	<u>100</u>
25. Waste Characteristics	1,000	<u>320</u>
<u>Targets</u>		
26. Sensitive Environments		
26a. Level I Concentrations	b	<u>0</u>
26b. Level II Concentrations	b	<u>425</u>
26c. Potential Contamination	b	<u>0</u>
26d. Sensitive Environments (lines 26a + 26b + 26c)	b	<u>425</u>
27. Targets (value from 26d)	b	<u>425</u>
<u>Environmental Threat Score</u>		
28. Environmental Threat Score ([lines 22 x 25 x 27]/82,500, subject to a maximum of 60)	60	<u>60</u>
<b>SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORE FOR A WATERSHED</b>		
29. Watershed Score <sup>c</sup> (lines 13 + 21 + 28, subject to a maximum of 100)	100	<u>100</u>
<b>SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORE</b>		
30. Component Score ( $S_{of}$ ) <sup>c</sup> , (highest score from line 29 for all watersheds evaluated, subject to a maximum of 100)	100	<u>100</u>

<sup>a</sup>Maximum value applies to waste characteristics category.

<sup>b</sup>Maximum value not applicable.

<sup>c</sup>Do not round to nearest integer.

TABLE 4-25  
GROUND WATER TO SURFACE WATER MIGRATION PATHWAY SCORESHEET

Factor Categories and Factors		Maximum Value	Value Assigned
DRINKING WATER THREAT			
<u>Likelihood of Release to an Aquifer</u>			
1.	Observed Release	550	<u>550</u>
2.	Potential to Release		
2a.	Containment	10	<u>NS</u>
2b.	Net Precipitation	10	<u>NS</u>
2c.	Depth to Aquifer	5	<u>NS</u>
2d.	Travel Time	35	<u>NS</u>
2e.	Potential to Release [lines 2a x (2b + 2c + 2d)]	500	<u>NS</u>
3.	Likelihood of Release (higher of lines 1 and 2e)	550	<u>550</u>
<u>Waste Characteristics</u>			
4.	Toxicity/Mobility	a	<u>NS</u>
5.	Hazardous Waste Quantity	a	<u>NS</u>
6.	Waste Characteristics	100	<u>NS</u>
<u>Targets</u>			
7.	Nearest Well	50	<u>NS</u>
8.	Population		
8a.	Level I Concentrations	b	<u>NS</u>
8b.	Level II Concentrations	b	<u>NS</u>
8c.	Potential Contamination	b	<u>NS</u>
8d.	Population (lines 8a + 8b + 8c)	b	<u>NS</u>
9.	Resources	5	<u>NS</u>
10.	Targets (lines 7 + 8d + 9)	b	<u>NS</u>
<u>Drinking Water Threat Score</u>			
11.	Drinking water Threat Score [(lines 3 + 6 + 10) / 82,500, subject to a maximum of 100]	100	<u>NS</u>

<u>Factor Categories and Factors</u>	<u>Maximum Value</u>	<u>Value Assigned</u>
<b>HUMAN FOOD CHAIN THREAT</b>		
<u>Likelihood of Release</u>		
12. Likelihood of Release (same value as line 3)	550	<u>550</u>
<u>Waste Characteristics</u>		
13. Toxicity/Mobility/Persistence/Bioaccumulation	(a)	<u>5 x 10<sup>8</sup></u>
14. Hazardous Waste Quantity	(a)	<u>10,000</u>
15. Waste Characteristics	1,000	<u>1,000</u>
<u>Targets</u>		
16. Food Chain Individual	50	<u>45</u>
17. Population		
17a. Level I Concentrations	(b)	<u>0</u>
17b. Level II Concentrations	(b)	<u>0.03</u>
17c. Potential Human Food Chain Contamination	(b)	<u>0</u>
17d. Population (lines 17a + 17b + 17c)	(b)	<u>0.03</u>
18. Targets (lines 16 + 17d)	(b)	<u>45.03</u>
<u>Human Food Chain Threat Score</u>		
19. Human Food Chain Threat Score ([lines 12 x 15 x 18] / 82,500, subject to a maximum of 100)	100	<u>100</u>

<sup>a</sup>Maximum value applies to waste characteristics category.

<sup>b</sup>Maximum value not applicable.

<sup>c</sup>Do not round to nearest integer.



<u>Factor Categories and Factors</u>	<u>Maximum Value</u>	<u>Value Assigned</u>
<b>ENVIRONMENTAL THREAT</b>		
<u>Likelihood of Release</u>		
20. Likelihood of Release (same value as line 3)	550	<u>550</u>
<u>Waste Characteristics</u>		
21. Ecosystem Toxicity/Mobility/Persistence/Bioaccumulation	(a)	<u>5 x 10<sup>8</sup></u>
22. Hazardous Waste Quantity	(a)	<u>10,000</u>
23. Waste Characteristics	1,000	<u>1,000</u>
<u>Targets</u>		
24. Sensitive Environments:		
24a. Level I Concentrations	(b)	<u>0</u>
24b. Level II Concentrations	(b)	<u>425</u>
24c. Potential Contamination	(b)	<u>0</u>
24d. Sensitive Environments (lines 24a + 24b + 24c)	(b)	<u>425</u>
25. Targets (value from line 24d)	(b)	<u>425</u>
<u>Environmental Threat Score</u>		
26. Environmental Threat Score ([lines 20 x 23 x 25]/ 82,500, subject to a maximum of 60)	60	<u>60</u>
<b>GROUND WATER TO SURFACE WATER MIGRATION COMPONENT SCORE FOR A WATERSHED</b>		
27. Watershed Score <sup>c</sup> (lines 11 + 19 + 26, subject to a maximum of 100)	100	<u>100</u>
28. Component Score (S <sub>gs</sub> ) <sup>c</sup> (highest score from line 27 for all watersheds evaluated, subject to a maximum of 100)	100	<u>100</u>

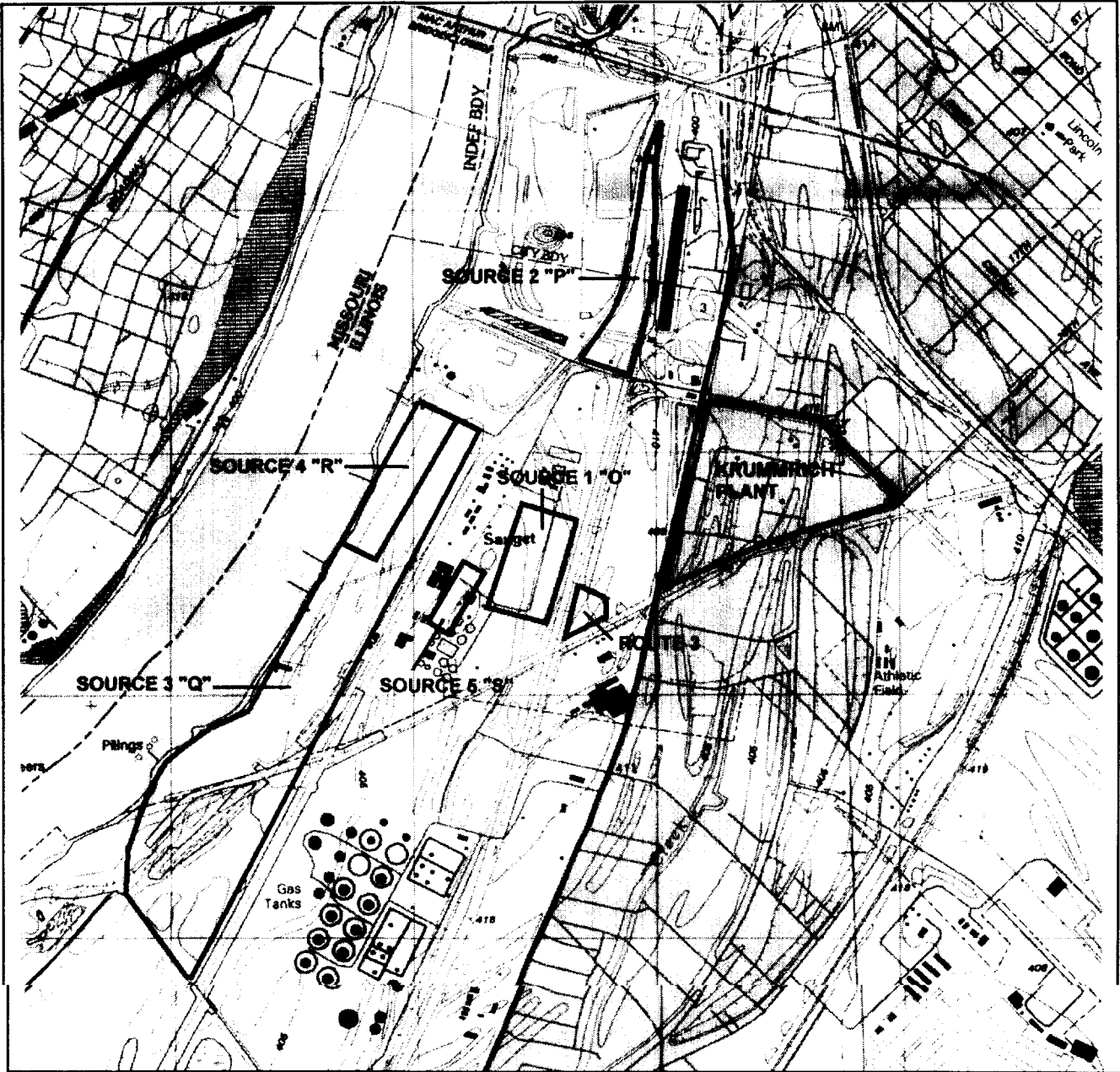
# SDMS US EPA REGION V

## COLOR-RESOLUTION - 2

### IMAGERY INSERT FORM

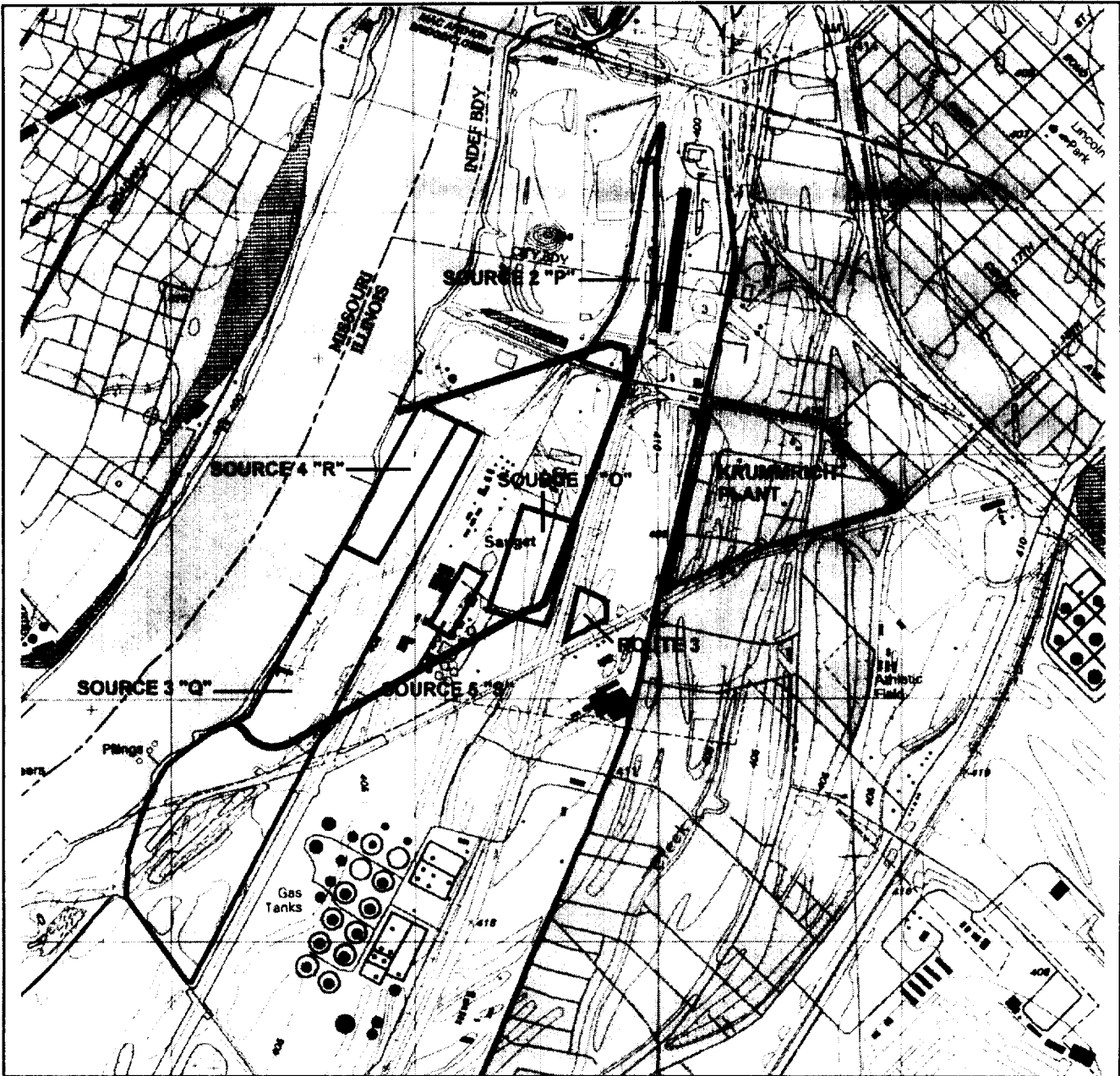
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<b>SITE NAME</b>	SAUGET AREA II
<b>DOC ID #</b>	150692
<b>DESCRIPTION OF ITEM(S)</b>	SITE MAPS
<b>PRP</b>	RMD - SAUGET II
<b>DOCUMENT VARIATION</b>	___ COLOR <b>OR</b> <u>X</u> RESOLUTION
<b>DATE OF ITEM(S)</b>	3/1/01 & 3/26/01
<b>NO. OF ITEMS</b>	2
<b>PHASE</b>	SAS
<b>OPERABLE UNITS</b>	
<b>PHASE</b> (AR DOCUMENTS ONLY)	___ Remedial    ___ Removal    ___ Deletion Docket    ___ Original ___ Update #    ___ Volume    of    ___
<b>COMMENT(S)</b>	
FIGURE 1 & 2	

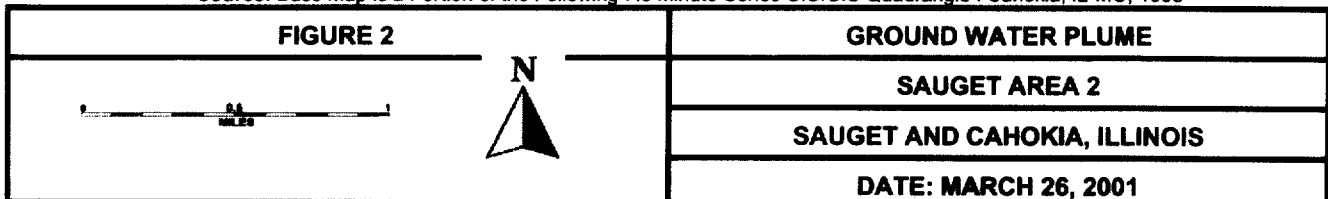


Source: Base Map is a Portion of the Following 7.5 Minute Series U.S.G.S Quadrangle : Cahokia, IL-MO, 1998

<p><b>FIGURE 1</b></p>	<p><b>SITE LOCATION MAP</b></p>
<p>0 0.5 1.0 Miles</p> <p>N</p>	<p><b>SAUGET AREA 2</b></p> <p><b>SAUGET AND CAHOKIA, ILLINOIS</b></p> <p><b>DATE: MARCH 1, 2001</b></p>



Source: Base Map is a Portion of the Following 7.5 Minute Series U.S.G.S Quadrangle : Cahokia, IL-MO, 1998



## REFERENCES

- | Ref.<br>No. | <u>Description of the Reference</u>  |
|-------------|--|
| 1.          | U.S. Environmental Protection Agency (EPA). Hazard Ranking System, 55 FR 51533 (40 CFR Part 300, Appendix A). December 14, 1990. 165 pages.  |
| 2.          | EPA. Superfund Chemical Data Matrix (SCDM). Publication 9345.1-22, EPA/540/R-961029, PB96-963510. June 1996. Publicly Available Document - relevant pages included. 42 pages.  |
| 3.          | U.S. Geological Survey (USGS), Cahokia, Illinois; Webster Groves, Missouri; and Oakville, Missouri Quadrangles, 7.5 Minute Series, Topographic Maps. 1998. 3 Maps.   |
| 4.          | EPA. Latitude and Longitude Calculation Worksheet. 1 page, 1 map.  |
| 5.          | Ecology and Environment, Inc. Sauget Area 1 and 2 Sites, St. Clair County, Illinois, Volume 2 - Sauget Area 2 Data Tables/Maps. ARCS Contract No. 68-W8-0086, Work Assignment No. 47-5N60. February 1998. 571 pages. |
| 6.          | Illinois EPA, Pre-Remedial Unit. CERCLA Screening Site Inspection (SSI): Sauget Sites Area #2. 1991. 161 pages.  |
| 7.          | Ecology and Environment, Inc. Expanded Site Investigation Dead Creek Project Sites at Cahokia/Sauget, Illinois, Final Report Volume 2 of 2. May 1988. 59 pages.  |
| 8.          | Ecology and Environment, Inc. Draft of Federal On-scene Coordinator's Report for Area 2 Site Q, Cahokia, St. Clair County, Illinois. July 31, 2000. 88 pages.  |
| 9.          | Illinois EPA. Analytical data sheets from samples collected during the May 1999 Expanded Site Inspection, May - June 1999. 300 pages.  |
| 10.         | Army Corps of Engineers, St. Louis District. Excerpts from 1979 Flood Manual and photos of the 1993 Flood. February, 2000. 15 pages.   |
| 11.         | Mensing, Kenneth. Photographs taken during sampling event of discharge to the Mississippi River. I.D.# 1630200005, Superfund/Technical. December 14, 1988. 7 pages.  |
| 12.         | Illinois EPA. Trip Report for: Solutia / W. G. Krummrich Plant, May 1999 Expanded Site Inspection. March, 2000. 27 pages.  |
| 13.         | Illinois EPA. Sauget Area 2 site photos. September 1993. 10 pages.   |
| 14.         | Illinois EPA. Trip Report for: Sauget Area 2, May 1999 Expanded Site Inspection. March, 2000. 38 pages.  |
| 15.         | Glosser, Deanna, Illinois Department of Natural Resources (IDNR). Natural Resource and Recreational Information. March 14, 2000. 6 pages.  |
| 16.         | Roux Associates, Inc. Summary of Ground-Water Quality Conditions, W. G. Krummrich Plant Solutia, Inc., Sauget, Illinois, Volume I of II. December 9, 1997. 82 pages.   |
| 17.         | Geraghty & Miller, Inc. Remedial Investigation at Sauget Site R, Monsanto Company, Sauget, Illinois; Appendix F - Ground Water Flow Conditions. August 1994. 9 pages.  |

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19. Barr, Julia. DynCorp. Project Note: Adjusted CRQL\CRDLs. May 2001. 1 page.
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24. Geraghty & Miller. Analytical data sheets from samples included in the 1994 Remedial Investigation at Sauget Site R. May-June 1992. 120 pages.
25. Illinois EPA. Sample data sheets from samples collected from Source Q, November 9-10, 1994. November-December, 1994. 42 pages.
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30. U. S. EPA. Quick Reference Fact Sheet: Using Qualified Data to Document an Observed Release and Observed Contamination. EPA 540-F-94-028. November 1996. 18 pages.

## SITE DESCRIPTION

The Sauget Area 2 site is the location of the release of hazardous substances resulting from the treatment and disposal of hazardous waste in the floodplain bordering the east side of the Mississippi River. The Sauget Area 2 site lies within the corporate boundaries of 3 towns: Cahokia, East St. Louis, and Sauget, Illinois. Adjacent to this site is the Sauget Area I superfund site. The Sauget Area 2 site consists of five sources, including a backfilled lagoon (O), four landfills (Q, P, R, S), and the ground water and surface water contamination emanating from these sources. The estimated area of the site, including all of the sources is 312 acres. The site is located atop an ancient sandbar created by the meandering nature of the Mississippi River.

The ground water table elevation is essentially the same as the river water height, and seasonally is at or above (during floods) the land surface. Water and entrained contamination moves freely from the ground water into or out of the river depending on the season. A levee was constructed bisecting the site in the 1950s to prevent surface water from flooding areas east of the levee, including several of the site sources, but does not prevent sources west of the levee being inundated by spring floods. It also does not restrict contaminant transport in the direction of the river from sources east of the levee, through the unsaturated and saturated zones under the levee. All five site sources are, at times, in the water table, and contamination migrating from them has commingled to the point that the resulting ground water contaminant plumes from each source cannot be isolated and extends between all the sources. In addition, some of these sources were placed directly into wetland areas. Contaminated sediments identified with the site are also present in the Mississippi River adjacent to the site.

High levels of chlorobenzenes, chlorophenols, chloroanilines, nitroanilines, polychlorinated biphenyls (PCBs) and heavy metals have been found in various combinations in each source, in the ground water below the sources and in the Mississippi River adjacent to the sources. Monsanto Chemical Company began operations at the former Commercial Acid Company in 1917. Industrial wastes generated at the facility were deposited within the property boundaries of the Krummrich/Solutia plant, as well as other landfill sites within the village of Sauget. Disposal began at the Sauget Area 2 Site in the mid to late 1950s when the levee was created.

From 1957 to 1977, Sauget and Company, Inc., owned by Leo Sauget, arranged for the transportation and disposal of chemical waste products generated by Monsanto to landfill R. From 1966 to 1973, Source 3 (Q) was also being used to dispose of municipal and hazardous wastes. Many of the chemical wastes discovered at Source 3 (Q) are identical to those found at Source 4 (R) as the two sites were operated by the same firm, Sauget and Company, Inc., during a similar time frame.

Between 1960 and 1980, Monsanto contributed almost 80% of the total wastewater volume to the Village of Monsanto/Sauget POTW. The wastes present in the dewatering lagoons [source 1 (O)] are similar to those found elsewhere at Sauget Area 2. Also during this time, beginning in 1972, Monsanto and the Edwin Cooper Company were permitted to dispose industrial waste at a landfill known as Source 2 (P). Sampling indicated significant levels of benzene compounds, which were products produced at the Monsanto chemical plant during Source 2's (P) operation.

Source 5 (S) was used as a still-bottom disposal area for Clayton Chemical Company after 1973. This disposal pit was allegedly excavated by Paul Sauget/Sauget and Company for Clayton's use. Waste found in this area resembles waste from other sources.

In addition to the sources mentioned above, a ground water plume exists below the site. The ground water plume contains a mixture of the hazardous substances found in the other sources. Due to limited sampling and the nature of the ground water flow beneath the site, the exact extent of the plume is unknown. But, the ground water plume extends from the river edge, where it is in direct communication with the river, to west of the flood levee.

Contamination at the Krummrich/Solutia facility is not being evaluated in the scoring at this time as it may be remediated under a separate authority.

## 2.2 SOURCE CHARACTERIZATION

### 2.2.1 SOURCE IDENTIFICATION

Name of source: Source O

Number of source: 1

Source Type: Surface Impoundment

Description and Location of Source:

Source O consists of four inactive sludge dewatering lagoons associated with the Village of Monsanto/Sauget Wastewater Treatment Plant (WWTP)<sup>1</sup>. The source is located on Mobile Avenue in Sauget, east of the flood control levee. The source covers approximately 20 acres to the northeast of the American Bottoms WWTP, which replaced the Village of Monsanto/Sauget WWTP in the late 1980s (figure 1). The lagoons have been covered with clay and vegetated, and no waste material is present at the surface (Ref. 5, p. 15). An access road to the more recent WWTP runs through the middle of the source. The Village of Monsanto/Sauget WWTP began operation in approximately 1952 (Ref. 7, p. O-1). The plant treated waste from area industries and residents. Approximately 10 million gallons per day of wastewater was treated, more than 95% was from area industries (Ref. 7, p. O-1). Industries that contributed wastewater to the plant include Monsanto, Cerro Copper, Sterling Steel Foundry, Amax Zinc, Rogers Cartage, Edwin Copper, and Midwest Rubber (Ref. 7, p. O-1). The lagoons which comprise Source O were used as sludge drying beds for the Village of Monsanto/Sauget WWTP (Ref. 14, p. 1). It is not known if sludge was removed from the lagoons prior to closure and capping, however, as shown below, hazardous substances have been found at depth in the source.

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<sup>1</sup>Effluent from the plant was discharged to the Mississippi River under NPDES permit. The Sauget WWTP had many past violations of the NPDES permit, mainly due to chemical quality of the plant effluent (Ref. 7, p. O-1). Mercury, PCBs and organic solvents had been detected at levels which violated the set permit levels on several occasions. A 1982 USEPA study concluded that the effluent from the Sauget WWTP contributed a substantial volume of priority pollutants annually to the river (Ref. 7, p. O-1).



Containment:

Containment Description	Containment Factor Value	Ref.
Gas release to air:	NS	
Particulate release to air:	NS	
Release to ground water: As documented during site visits, this source has a vegetated cover in place but no liner or leachate collection and removal system or functioning ground water monitoring system.	10	Ref 1, Table 3-2 Ref. 5, p. 14, 15
Release via overland migration and flood: <u>Overland Flow</u> : As documented during site visits, this source has a vegetated cover in place, but has no functioning or maintained run-on control system and runoff management system, or liner with leachate collection and removal system, or a liner with functioning leachate collection and removal system above liner. <u>Flood</u> : There is no documentation that containment at the source is designed, constructed, operated, and maintained to prevent a washout of hazardous substances by flood.	9  10	Ref. 1, Table 4-2 Ref. 5, p. 14, 15  Ref. 1, Table 4-8 Ref. 5, p. 14, 15

**2.2.2 HAZARDOUS SUBSTANCES ASSOCIATED WITH THE SOURCE**

## - Source Samples:

The following source sample documents the presence of the listed hazardous substances at the source. Sample X108 was collected during the Illinois EPA, May 1999 site visit (Ref. 14).

Sample ID	Sample Type	Date Collected	Hazardous Substance	Hazardous Substance Concentration (ug/kg)	Sample Quantitation Limit* (ug/kg)	Reference
X 108	Waste	5-24-99	Manganese	598	20.2	9, p. C-41; 14, p. 9, 10
			Vanadium	30.1	67.3	

\* Adjusted CRQL/CRDL for substance (Ref. 19).

- Hazardous substances are listed to document the presence of the substance at the source and may be below SQL, however it is above the detection limit.

**2.2.4 HAZARDOUS WASTE QUANTITY****2.4.2.1.1. Hazardous Constituent Quantity**

Hazardous Constituent Quantity Assigned Value: 0

**2.4.2.1.2. Hazardous Wastestream Quantity**

Hazardous Wastestream Quantity Assigned Value: 0

**2.4.2.1.3. Volume**

Volume Assigned Value: 0

**2.4.2.1.4. Area**Description

The area of the source was calculated from the aerial photograph that best outlined the source (3/4/75) (Ref. 22). The photographic scale was determined by measuring equal distances on the USGS 7.5 minute Cahokia Quadrangle and on the aerial photograph. A polar planimeter was used by Illinois EPA staff, to trace the perimeter of the source on the aerial photographs. Three consecutive runs were made over the source and the lowest area value was used (Ref. 14, p. 17)

Source Type	Units (ft <sup>2</sup> )	References
Surface Impoundment	22.48 acres = 979,468.80 ft <sup>2</sup>	Ref 14, p. 17

Sum (ft<sup>2</sup>): 979,468.80 = A

Equation for Assigning Value (Ref. 1, Table 2-5): A/13

Area Assigned Value: 75,343.75

**2.4.2.1.5. Source Hazardous Waste Quantity Value**

Highest assigned value assigned from Ref. 1, Table 2-5: 75,343.75

## 2.2.1 SOURCE IDENTIFICATION

Name of source: Source P

Number of source: 2

Source Type: Landfill

Description and Location of Source :

Source P is an inactive, IEPA-permitted landfill covering approximately 28.6 acres in Sauget and East St. Louis, Illinois (figure 1; Ref. 14, p. 19). This landfill is located on the east side of the flood control levee (figure 1). The source is bordered on the west by the Illinois Central Gulf Railroad; on the south by Monsanto Avenue, and on the east by the Terminal Railroad Association railroad. The two railroads converge to delineate the north boundary (Ref. 7, p. P-1). Surface drainage is to the south-central portion of the source, which was not land filled due to the presence of a potable water line in this area. A depression area is also found along the east perimeter, adjacent to the Terminal Railroad (Ref. 7, p. P-1). Soil and vegetation in the northern and southern portions of this source have been identified as a wetland, according to the Division of Natural Heritage, Illinois Department of Conservation (Ref. 20, p. 14).

Sauget and Company began operating a waste disposal facility at Source P in 1973, permitted to accept only non-chemical waste from Monsanto. In 1974 Sauget and Company was granted a permit to accept diatomaceous earth filter cake from Edwin Cooper, Inc (Ref. 7, p. P-1). Violations of these permits were found during routine inspections of the source by the IEPA. In 1975, a routine inspection discovered several crushed fiber drums, labeled "Monsanto ACL-85, Chlorine Composition." (Ref 7, p. P-1) Additionally, during an inspection in 1977, 25 metal containers of phosphorus pentasulfide were found at the source. A Southern Railway slag pile and cinders were being used as final cover material. The IEPA found this material unsuitable as cover due to its high permeability and heavy metal content (Ref. 7, p. P-3).

Containment:

Containment Description	Containment Factor Value	Ref.
Gas release to air:	NS	
Particulate release to air:	NS	
Release to ground water: As documented from site visits, there is no evidence of a liner, adequate maintained engineered cover, functioning and maintained run-on control system and runoff management system, or functioning leachate collection and removal system.	10	Ref. 1, Table 3-2 Ref. 7, p. p-3
Release via overland migration and flood: <u>Overland Flow:</u> As documented from site visits, there is no evidence of a liner, adequate maintained engineered cover, or functioning and maintained run-on control system and runoff management system, or a liner with functioning leachate collection and removal system above liner	10	Ref. 1, Table 4-2 Ref. 7, p. p-3
<u>Flood:</u> There is no documentation that containment at the source is designed, constructed, operated, and maintained to prevent a washout of hazardous substances by flood.	10	Ref. 1, Table 4-8 Ref. 7, p. p-3

### 2.2.2 HAZARDOUS SUBSTANCES ASSOCIATED WITH THE SOURCE

- Source Samples:

The following source samples document the presence of the listed hazardous substances at the source. Samples X107 and X113 were collected by Illinois EPA during the May 1999 site visit (Ref. 14).

Sample ID	Sample Type	Date Collected	Hazardous Substance	Hazardous Substance Concentration (µg/kg)	Sample Quantitation Limit* (µg/kg)	Reference
X 107	Waste	5-26-99	Benzene	10,000	2020	9, p. A-52; 14, p. 9
			Toluene	25,000	2020	9, p. A-52; 14, p. 9
			Ethyl benzene	3600	2020	9, p. A-52; 14, p. 9
			Xylene (total)	15,000	2020	9, p. A-52; 14, p. 9
			Endosulfan I	440 P	2.5	9, p. A-60; 14, p. 10
			4,4-DDE	210 P	5	9, p. A-60; 14, p. 10
			Endosulfan II	320	5	9, p. A-60; 14, p. 10
			Aroclor 1248	4400	49.8	9, p. A-60; 14, p. 10
			Aroclor 1254	5900 P	49.8	9, p. A-60; 14, p. 10
			Copper	49.2	31.0	9, p. C-46; 14, p. 10
			Lead	140	3.7	9, p. C-46; 14, p. 10
			Vanadium	33.4	62.0	9, p. C-46; 14, p. 10
X 113	Waste	5-25-99	Phenol	65,000 D	63	9, p. A-101; 14, p. 9
			4 - Methyl phenol	5400	63	9, p. A-98; 14, p. 9
			4 - Chloroaniline	23,000	63	9, p. A-98; 14, p. 9
			Aldrin	140 P	2.6	9, p. A-104; 14, p. 10
			1,4 - Dichlorobenzene	8600	1.9	9, p. A-98; 14, p. 10
			Aroclor 1242	2400	50.4	9, p. A-104; 14, p. 10
			Chromium	21.9	11.8	9, p. C-45; 14, p. 10
			Nickel	26.5	47.4	9, p. C-45; 14, p. 10
			Zinc	988	23.7	9, p. C-45; 14, p. 10

D - diluted sample

P - greater than 25% difference for the detected concentrations between the two columns. The lower of the two results is reported.

\* Adjusted CRQL/CRDL for substance (Ref. 19).

- Hazardous substances are listed to document the presence of the substance at the source and may be below SQL, however it is above the detection limit.

**2.2.4 HAZARDOUS WASTE QUANTITY****2.4.2.1.1. Hazardous Constituent Quantity**

Hazardous Constituent Quantity Assigned Value: 0

**2.4.2.1.2. Hazardous Wastestream Quantity**

Hazardous Wastestream Quantity Assigned Value: 0

**2.4.2.1.3. Volume**

Volume Assigned Value: 0

**2.4.2.1.4. Area**Description

The area of the source was calculated from the aerial photograph that best outlined the source. (2/27/80) (Ref. 22) The photographic scale was determined by measuring equal distances on the USGS 7.5 minute Cahokia Quadrangle and on the aerial photograph. A polar planimeter was used by Illinois EPA staff, to trace the perimeter of the source on the aerial photographs. Three consecutive runs were made over the source and the lowest area value was used (Ref 14, p. 17)

Source Type	Units (ft <sup>2</sup> )	References
Landfill	28.6 acres = 1,244,990.3 ft <sup>2</sup>	Ref 14, p. 19

Sum (ft<sup>2</sup>): 1,244,990.3 = A

Equation for Assigning Value (Ref. 1, Table 2-5): A/3400

Area Assigned Value: 366.17

**2.4.2.1.5. Source Hazardous Waste Quantity Value**

Highest assigned value assigned from Ref. 1, Table 2-5: 366.17

### 2.2.1 SOURCE IDENTIFICATION

Name of source: Source Q

Number of source: 3

Source Type: Landfill

Description and Location of Source (with reference to a map of the site):

Source Q is an inactive waste landfill in Sauget, Illinois that covers approximately 225 acres (Ref. 14, p. 18). The facility, which was operated by Sauget & Company between 1966 and 1973 (Ref. 7, p. Q-1). The source is located on the east bank of the Mississippi River and is on the river side (west) of the flood control levee (figure 1; Ref 7, p. Q-1). A railroad spur divides the source and several ponds exist on the unoccupied southern portion. The northern half of the source contains coal and cinders at the surface (Ref. 6, p. 2-5 ). Source Q was operated without a permit. The north side was registered with the IDPH in 1967, prior to formation of IEPA. The source is presently covered with black cinders which make it highly permeable. Source Q is presently being leased to the Pillsbury Company by its owners the Riverport Terminal and Fleeting Co. Most of Source Q is occupied by the Pillsbury Company, which operates a coal unloading and transfer facility (Ref. 7,p. Q-1). Erosion during the 1993 flood, which inundated Source Q and Source R, exposed buried drums later removed by USEPA (Ref. 13, pp. 1, 10).

Disposal operations began at Source Q in 1966. Several violations of the IEPA were documented in the early 1970s. The use of unsuitable cover materials, acceptance of liquid chemical wastes, and open burning were some of the violations. Between 1968 and 1972 septic tank pumpings were accepted and co-disposed with general municipal refuse on the source (Ref. 7, p. Q-1). Source Q was completely inundated during at least two Mississippi River flood events: The first in 1973 and the second in 1993 (Ref. 5, p. 21, 22). Photographs were taken of the exposed landfill material following the 1993 flood (Ref. 13, p. 1, 10 ). Many of the drums were exposed at the surface. Over time the deterioration of the drums contributed to the release of hazardous wastes to the surrounding soil, surface water and ground water (Ref. 8, p. 3). A CERCLA, time critical removal, coordinated by USEPA, began in October 1999, and removed 3,271 drums and approximately 15,000 tons of contaminated soil by its completion in April 2000 (Ref. 8, p. 2, 3). Due to limited resources and the amount of contamination, this removal action could not address all the contamination present on the site (Ref. 8, p. ii).

Containment:

Containment Description	Containment Factor Value	Ref.
Gas release to air:	NS	
Particulate release to air:	NS	
Release to ground water: Hazardous substances are present at the surface, there is no evidence of a liner, adequate maintained engineered cover, functioning and maintained run-on control system and runoff management system, or functioning leachate collection and removal system. Although a removal action was completed in April 2000, US EPA Region 5 considers it to be unfinished due to the contamination still present at the source.	10	Ref. 1, Table 3-2 Ref 5, p. 19
Release via overland migration and flood: <u>Overland Flow:</u> As documented from site visits, there is no evidence of an adequate maintained engineered cover, or functioning and maintained run-on control system and runoff management system, or a liner with functioning leachate collection and removal system above liner. Although a removal action was completed in April 2000, US EPA Region 5 considers it to be unfinished due to the contamination still present at the source. <u>Flood:</u> There is no documentation that containment at the source is designed, constructed, operated, and maintained to prevent a washout of hazardous substances by flood. Furthermore, the source has completely flooded at least twice in the past 30 years. Although a removal action was completed in April 2000, US EPA Region 5 considers it to be unfinished due to the contamination still present at the source.	10  10	Ref. 1, Table 4-2 Ref 5, p. 19  Ref. 1, Table 4-8 Ref 5, p. 19

### 2.2.2 HAZARDOUS SUBSTANCES ASSOCIATED WITH THE SOURCE

- Source Samples:

The following source samples document the presence of the listed hazardous substances at the source. Samples X102-X105, and X111 were collected by Illinois EPA during the May 1999 site visit (Ref. 14).

Sample ID	Sample Type	Date Collected	Hazardous Substance	Hazardous Substance Concentration** (µg/kg)	Sample Quantitation Limit* (µg/kg)	Reference
X 102	Waste	5-24-99	Beryllium	4	7.5	9, p. C-40; 14, p. 10
			Chromium	57.3	15	9, p. C-40; 14, p. 10
			Cobalt	14.4	75.1	9, p. C-40; 14, p. 10
			Nickel	47.1	60.1	9, p. C-40; 14, p. 10
			Vanadium	96.7	75.1	9, p. C-40; 14, p. 10
			Zinc	386	30	9, p. C-40; 14, p. 10
X 104	Waste	5-26-99	Benzene	5800	2389	9, p. A-33; 14, p. 9
			Toluene	4800	2389	9, p. A-33; 14, p. 9
			Chlorobenzene	13,000	2389	9, p. A-33; 14, p. 9
			Xylene (total)	34,000	2389	9, p. A-33; 14, p. 9
			Phenol	220,000	75,046.9	9, p. A-35; 14, p. 9
			1,2,4 - Trichlorobenzene	430,000	2389	9, p. A-35; 14, p. 9
			4,4 - DDE	730,000 P	14,634	9, p. A-38; 14, p. 10
			4,4 - DDT	53,000 JP	14,634	9, p. A-38; 14, p. 10
			Aroclor 1016	5,400,000	146,341	9, p. A-38; 14, p. 10
			Aroclor 1232	8,800,000	146,341	9, p. A-38; 14, p. 10
			Aroclor 1242	8,500,000 P	146,341	9, p. A-38; 14, p. 10
			Aroclor 1248	25,000,000	146,341	9, p. A-38; 14, p. 10
			Aroclor 1254	17,000,000	146,341	9, p. A-38; 14, p. 10
			Aroclor 1260	8,100,000 P	146,341	9, p. A-38; 14, p. 10
			Barium	2450	223.0	9, p. C-48; 14, p. 10
			Lead	728	3.3	9, p. C-48; 14, p. 10
X 103	Waste	5-26-99	Delta - BHC	68 P	2.7	9, p. A-31; 14, p. 10
			Gamma - BHC (lindane)	55 P	2.7	9, p. A-31; 14, p. 10
			Endosulfan I	24 P	2.7	9, p. A-31; 14, p. 10
			4,4 - DDD	340 P	5.2	9, p. A-31; 14, p. 10
			Endosulfan Sulfate	59 P	5.2	9, p. A-31; 14, p. 10



Sample ID	Sample Type	Date Collected	Hazardous Substance	Hazardous Substance Concentration** (µg/kg)	Sample Quantitation Limit* (µg/kg)	Reference
			Endrin Aldehyde	87 P	5.2	9, p. A-31; 14, p. 10
			Gamma-chlordane	23 P	2.7	9, p. A-31; 14, p. 10
			Cadmium	12	5	9, p. C-47; 14, p. 10
			Copper	179	25	9, p. C-47; 14, p. 10
X 111	Waste	5-26-99	Ethyl benzene	7400	1900	9, p. A-80; 14, p. 9
			Naphthalene	860	490	9, p. A-82; 14, p. 9
			4 - Chloroaniline	1100	490	9, p. A-82; 14, p. 9
			2-Methylnaphthalene	540	490	9, p. A-82; 14, p. 9
			Diethylphthalate	1200	490	9, p. A-83; 14, p. 9
			N-Nitrosodiphenylamine	510	490	9, p. A-83; 14, p. 9
			Pentachlorophenol	2500	490	9, p. A-83; 14, p. 9
			Phenanthrene	1100	490	9, p. A-83; 14, p. 9
			Fluoranthene	850	490	9, p. A-83; 14, p. 9
			Pyrene	1600	490	9, p. A-83; 14, p. 9
			Benzo(a)anthracene	500	490	9, p. A-83; 14, p. 9
			Chrysene	920	490	9, p. A-83; 14, p. 9
			Benzo(b)fluoranthene	600	490	9, p. A-83; 14, p. 9
			Heptachlor	25 P	2.5	9, p. A-88; 14, p. 10
			Heptachlor Epoxide	11 P	2.5	9, p. A-88; 14, p. 10
			Endrin	90 P	5.0	9, p. A-88; 14, p. 10
			Endosulfan II	150	5.0	9, p. A-88; 14, p. 10
			Manganese	934	20.7	9, p. C-51; 14, p. 10

D - Diluted sample

P - greater than 25% difference for the detected concentrations between the two columns. The lower of the two results is reported.

\* Adjusted CRQL/CRDL for substance (Ref. 19).

\*\*While some of the values were qualified during QC review, the qualifiers only effect the accuracy of the quantification, the presence of these substances is not in doubt.

- Hazardous substances are listed to document the presence of the substance at the source and may be below SQL, however it is above the detection limit.

**2.2.4 HAZARDOUS WASTE QUANTITY****2.4.2.1.1. Hazardous Constituent Quantity**

Hazardous Constituent Quantity Assigned Value: 0

**2.4.2.1.2. Hazardous Wastestream Quantity**

Hazardous Wastestream Quantity Assigned Value: 0

**2.4.2.1.3. Volume**

Volume Assigned Value: 0

**2.4.2.1.4. Area**Description

The area of the source is approximately 225.1 acres (Ref. 14, p. 18).

Source Type	Units (ft <sup>2</sup> )	References
Landfill	225.1 acres = 9,805,356 ft <sup>2</sup>	Ref. 14, p. 18

Sum (ft<sup>2</sup>): 9,805,356 =A

Equation for Assigning Value (Ref. 1, Table 2-5): A/3400

Area Assigned Value: 2883.9

**2.4.2.1.5. Source Hazardous Waste Quantity Value**

Highest assigned value assigned from Ref. 1, Table 2-5: 2883.9

## 2.2.1 SOURCE IDENTIFICATION

Name of source: Source RNumber of source: 4Source Type: LandfillDescription and Location of Source (with reference to a map of the site):

Source R is a former industrial waste landfill situated adjacent to the Mississippi River in Sauget, Illinois (figure 1). The source is located north and west of Source 3 (Q) on the river side (west) of a flood control levee (Ref. 7, p. R-1). Early IEPA files list the source name as the Sauget Toxic Dump (aka: Krummrich Landfill) (Ref. 5, p. 27). More recent reports and files list the source name as the Monsanto Landfill or River's Edge Landfill (Ref. 5, p. 27). The source is owned by Monsanto Chemical Co. and was used by Monsanto for waste disposal between 1957 and 1977 (Ref 5, p. 27). Following the 1973 flood, IEPA sent notices to Sauget & Co. and Monsanto which included notice of inadequate segregation of wastes, and a lack of the necessary permits to operate a disposal facility (Ref. 7, p. R-3, R-8). Source R is covered with a clay cap and vegetated and drainage is directed to ditches around the perimeter of the site (Ref 7, p. R-1). Beginning in 1978, Monsanto restricted access to Source R by fencing and under 24-hour camera surveillance (Ref. 5, pp. 27, 28). There is no documentation that a liner exists to prevent ground water from flowing through the source. Evidence of this flow has been documented as leachate seeps sampled in 1981 showing the presence of metals (Ref. 5, pp. 29, 111).

Containment:

<u>Containment Description</u>	<u>Containment Factor Value</u>	<u>Ref.</u>
Gas release to air:	NS	
Particulate release to air:	NS	
Release to ground water: Although a clay cap was installed in 1979 over the landfill material to prevent infiltration, contaminants are able to travel from the source via ground water. A containment Factor of 10 was assigned due to the lack of evidence of a liner, adequate maintained engineered cover, functioning and maintained run-on control system and runoff management system, or functioning leachate collection and removal system.	10	Ref. 1, Table 3-2 Ref. 5, p. 26
Release via overland migration and/or flood: <u>Overland Flow</u> : As documented from site visits, there is a clay cover, but no evidence of functioning and maintained run-on control system and runoff management system, or a liner with functioning leachate collection and removal system above liner. <u>Flood</u> : There is documentation that containment features at the source are designed to prevent a washout of hazardous substances by flooding. However there is no liner to prevent the flow of ground water through the source. Leachate seeps collected west of the source, along the river bank, document the presence of this flow and the migration of this contamination.	9  10	Ref. 1, Table 4-2 Ref. 5, p. 26  Ref. 1, Table 4-8 Ref. 5, p. 26

### 2.2.2 HAZARDOUS SUBSTANCES ASSOCIATED WITH THE SOURCE

- Source Samples:

The following source samples document the presence of the listed hazardous substances in the source. The samples listed in the following table were collected in May 1992, by Geraghty & Miller.

Sample ID	Sample Type	Date	Hazardous Substance	Hazardous Substance Concentration** (µg/kg)	Sample Quantitation Limit* (µg/kg)	Reference
SB14 20-22	Waste	May 1992	Benzene	1500	10	5, p. 24; 24, p. 36
			Toluene	11,000	10	5, p. 24; 24, p. 36
			2,4-Dimethyl phenol	77,000	330	5, p. 24; 24, p. 37
			4-Nitroaniline	180,000	830	5, p. 24; 24, p. 38
			Phenol	2,300,000 D	330	5, p. 24; 24, p. 43
			4-Methyl phenol	420,000 D	330	5, p. 24; 24, p. 43
			Alpha BHC	1100 E	1.7	5, p. 24; 24, p. 39
			Endosulfan I	440	1.7	5, p. 24; 24, p. 39
SB14 30-32	Waste	May 1992	Chloroform	89	10	5, p. 24; 24, p. 49
			1,2-Dichloroethane	160	10	5, p. 24; 24, p. 49
			N-hexane	890 JD		5, p. 24; 24, p. 57
			1,2-Dichlorobenzene	110,000	10	5, p. 24; 24, p. 50
			1,2,4-Trichlorobenzene	51,000	10	5, p. 24; 24, p. 50
			Heptachlor Epoxide	420	1.7	5, p. 24; 24, p. 61
SB15 16-18	Waste	May 1992	2-Butanone	950 JB	10	5, p. 24; 24, p. 71
			4-Methyl, 2-Pentanone	3,500,000 D	10	5, p. 24; 24, p. 75
			Tetra Chloroethane	1200 J	10	5, p. 24; 24, p. 71
			Chlorobenzene	510,000 D	10	5, p. 24; 24, p. 75
			Ethyl benzene	670,000 D	10	5, p. 24; 24, p. 75
			Xylenes (t)	4,800,000 D	10	5, p. 24; 24, p. 64
			Nitrobenzene	340,000 D	330	5, p. 24; 24, p. 80
			1,4-Dichlorobenzene	77,000	10	5, p. 24; 24, p. 70
			2,4,6-Trichlorophenol	1,600,000 D	330	5, p. 24; 24, p. 70
			2,4 Dichlorophenol	10,000,000D	330	5, p. 24; 24, p. 80

Sample ID	Sample Type	Date	Hazardous Substance	Hazardous Substance Concentration** (µg/kg)	Sample Quantitation Limit* (µg/kg)	Reference
			Delta BHC	480	1.7	5, p. 24; 24, p. 70
SB16 16-18	Waste	May 1992	4-Chloroaniline	150,000 D	330	5, p. 24; 24, p. 119
			2,4,6-Trichlorophenol	14,000 D	330	5, p. 24; 24, p. 97
			Heptachlor	17	1.7	5, p. 24; 24, p. 91
			Aldrin	43 D	1.7	5, p. 24; 24, p. 116
			Methoxychlor	130	17	5, p. 24; 24, p. 91
			Endrin Ketone	59	3.3	5, p. 24; 24, p. 91
			Gamma chlordane	43 D	1.7	5, p. 24; 24, p. 116
			4,4-DDE	270 D	3.3	5, p. 24; 24, p. 116
			4,4-DDD	250 D	3.3	5, p. 24; 24, p. 116
SB16 28-30	Waste	May 1992	2-Chlorophenol	1,100,000 D	330	5, p. 24; 24, p. 106
			Pentachlorophenol	43,000 JD	830	5, p. 24; 24, p. 104
			Alachlor	950	830	5, p. 24; 24, p. 110

B - Substance found in blank

D - Diluted sample

E - Estimated value, concentrations exceeded the calibration range of the instrument.

J - Estimated value

\* Adjusted CRQL/CRDL for substance (Ref. 19).

\*\*\*While some of the values were qualified during QC review, the qualifiers only effect the accuracy of the quantification, the presence of these substances is not in doubt.

**2.2.4 HAZARDOUS WASTE QUANTITY****2.4.2.1.1. Hazardous Constituent Quantity**

Hazardous Constituent Quantity Assigned Value: 0

**2.4.2.1.2. Hazardous Wastestream Quantity**

Hazardous Wastestream Quantity Assigned Value: 0

**2.4.2.1.3. Volume**

Volume Assigned Value: 0

**2.4.2.1.4. Area**Description

The area of the source was calculated from the aerial photograph that best outlined the source (3/4/75) (Ref. 22). The photographic scale was determined by measuring equal distances on the USGS 7.5 minute Cahokia Quadrangle and on the aerial photograph. A polar planimeter was used by Illinois EPA staff, to trace the perimeter of the source on the aerial photographs. Three consecutive runs were made over the source and the lowest area value was used (Ref 14, p. 17).

Source Type	Units (ft <sup>2</sup> )	References
Landfill	24.75 acres = 1,078,211.17 ft <sup>2</sup>	Ref. 14, p. 18

Sum (ft<sup>2</sup>): 1,078,211.17 = AEquation for Assigning Value (Ref. 1, Table 2-5):  $A / 3400$ 

Area Assigned Value: 317.12

**2.4.2.1.5. Source Hazardous Waste Quantity Value**

Highest assigned value assigned from Ref. 1, Table 2-5: 317.12

Number of source: 5

Source Type: Landfill

**Description and Location of Source:**

**Containment:**

[illegible]

## 2.2.2 HAZARDOUS SUBSTANCES ASSOCIATED WITH THE SOURCE

### - Source Samples:

The following samples document the presence of hazardous substances at the source. Samples X-101-X-106 were collected by Illinois EPA in March 1995 (Ref. 5, pp. 232-236).

Sample ID	Sample Type	Date	Hazardous Substance	Hazardous Substance Concentration (µg/kg) **	Sample Quantitation Limit* (µg/kg)	Reference
X-101	Waste	3/22/95	4,4'-DDT	2.6 J	3.7	5, p. 235; 26, p. 12
X-102	Waste	3/22/95	Isophorone	340 J	388.2	5, p. 233; 26, p. 13
			Fluoranthene	170 J	388.2	5, p. 234; 26, p. 14
X-103	Waste	3/22/95	Dieldrin	4.8	4	5, p. 235; 26, p. 15
			Endrin	24	4	5, p. 235; 26, p. 15
X-105	Waste	3/22/95	Vinyl Chloride	1400	1.1	5, p. 232; 26, p. 17
			Chloroethane	1200 J	1.1	5, p. 232; 26, p. 17
			1,1-Dichloroethane	6500	1.1	5, p. 232; 26, p. 17
			Chloroform	550 J	1.1	5, p. 232; 26, p. 17
			Benzene	1800	1.1	5, p. 232; 26, p. 17
			4-Methyl-2-pentanone	93000	56	5, p. 232; 26, p. 18
			Tetrachloroethene	8600	1.1	5, p. 232; 26, p. 17
			Toluene	990,000	56	5, p. 232; 26, p. 18
			Ethyl benzene	450,000	56	5, p. 232; 26, p. 18
			Total Xylenes	620,000	56	5, p. 232; 26, p. 18
			Naphthalene	200,000	3882	5, p. 232; 26, p. 19
			2-Methylnaphthalene	50,000	3882	5, p. 232; 26, p. 19
			Endosulfan I	26	19.9	5, p. 235; 26, p. 20
			Endosulfan II	120	38.6	5, p. 235; 26, p. 20
			Gamma-chlordane	35	19.9	5, p. 235; 26, p. 20
X-106	Waste	3/22/95	1,2-Dichloroethene	550 J	9.8	5, p. 232; 26, p. 21
			1,1,1-Trichloroethane	12,000	9.8	5, p. 232; 26, p. 21
			Trichloroethene	2800	9.8	5, p. 232; 26, p. 21
			Phenanthrene	81,000	3300	5, p. 234; 26, p. 22
			Di-n-butyl phthalate	1,500,000	82,500	5, p. 234; 26, p. 23
			Pyrene	31,000	3300	5, p. 234; 26, p. 22



Sample ID	Sample Type	Date	Hazardous Substance	Hazardous Substance Concentration (µg/kg) **	Sample Quantitation Limit* (µg/kg)	Reference
			Aroclor-1248	85,000 C	1168.5	5, p. 235; 26, p. 24
			Aroclor-1254	69,000 C	1168.5	5, p. 235; 26, p. 24
			Aroclor-1260	41,000 C	1168.5	5, p. 235; 26, p. 24

C - Lowest concentration reported

J - Estimated value

\* Adjusted CRQL/CRDL for substance (Ref. 19).

\*\*While some of the values were qualified during QC review, the qualifiers only effect the accuracy of the quantification, the presence of these substances is not in doubt.

**2.2.4 HAZARDOUS WASTE QUANTITY****2.4.2.1.1. Hazardous Constituent Quantity**

Hazardous Constituent Quantity Assigned Value: 0

**2.4.2.1.2. Hazardous Wastestream Quantity**

Hazardous Wastestream Quantity Assigned Value: 0

**2.4.2.1.3. Volume**

Volume Assigned Value: 0

**2.4.2.1.4. Area**Description

The area of the source was calculated from the aerial photograph that best outlined the source (3/4/75) (Ref. 22). The photographic scale was determined by measuring equal distances on the USGS 7.5 minute Cahokia Quadrangle and on the aerial photograph. A polar planimeter was used to trace the perimeter of the source on the aerial photographs. Three consecutive runs were made over the source and the lowest area value was used (Ref. 14, p. 17).

Source Type	Units (ft <sup>2</sup> )	References
Landfill	10.76 acres = 468,731.39 ft <sup>2</sup>	Ref. 14, p. 18

Sum (ft<sup>2</sup>): 468,731.39 = A

Equation for Assigning Value (Ref. 1, Table 2-5): A/3400

Area Assigned Value: 137.86

**2.4.2.1.5. Source Hazardous Waste Quantity Value**

Highest assigned value assigned from Ref. 1, Table 2-5: 137.86

## SUMMARY OF SOURCE DESCRIPTIONS

Source No.	Source Hazardous Waste Quantity Value	Source Hazardous Constituent Quantity Complete? (Y/N)	Containment Factor Value by Pathway				
			Ground Water (GW) (Table 3-2)	Surface Water (SW)		Air	
				Overland/flood (Table 4-2)	GW to SW (Table 3-2)	Gas (Table 6-3)	Particulate (Table 6-9)
1 (O)	75,343.75	N	10	9/10	10	NS	NS
2 (P)	366.17	N	10	10/10	10	NS	NS
3 (Q)	2883.9	N	10	10/10	10	NS	NS
4 (R)	317.12	N	10	9/10	10	NS	NS
5 (S)	137.86	N	10	10/10	10	NS	NS

### Other sources not scored:

Name of source: **Krummrich/Solutia**

Source Type: Contaminated Soil

Description and Location of Source (with reference to a map of the site):

The W. G Krummrich Plant is the chemical manufacturing facility of Solutia Incorporated located in Sauget, Illinois (Ref. 12, p. 1). Bordered to the north by Monsanto Ave., the south by the Alton and Southern Railroad, and the West by the Terminal Railroad; this wedge shaped property contains approximately 172 acres within its boundaries (figure 1; Ref. 12, p. 1). In 1917 the Monsanto Chemical Co. acquired the former Commercial Acid Company for use as an operating facility. The W. G. Krummrich facility has produced a wide variety of chemicals, both organic and inorganic. According to a 1992 RCRA Facility Assessment Report, the following products and wastes have been or are presently generated at the facility: spent halogenated and non-halogenated solvents, mercury contaminated wastes, chlorobenzenes, nitrochlorobenzenes and benzene compounds, phenols, phosphorus, polychlorinated biphenyl (PCB) compounds, dioxins, aromatic nitro compounds, amines and nitroamines. agent orange, maleic anhydride, acids and caustics (Ref. 12, p. 1). Industrial wastes generated over time at the facility have been deposited within its property boundaries , as well as other landfill sites within the village of Sauget (Ref. 12, p. 1).

Name of source: **Rte. 3 Drum Site**

Source Type: Containers/Drums

Description and Location of Source (with reference to a map of the site):

The Route 3 Drum site is situated in the south west corner of lot F (figure 1), on the east side of the flood control levee. The site is located west of route 3, approximately 500 feet west-southwest of the southwest corner of the W. B. Krummrich plant. The drum site is unlined and was utilized by Monsanto in the mid to late 1940s to bury approximately 5000 55-gallon drums of nitrochlorobenzenes (Ref. 12, p. 2). According to a letter sent to Monsanto by Rollins Environmental Services, there were 4500 drums of Mono nitrochlorobenzenes (0-5%) and Di nitrochlorobenzenes (95-100%); and 500 drums of Mono nitrobiphenyls (65%), Biphenyl (21%) and Unknown substances (14%) (Ref. 21, p. 3). In 1985 Monsanto began to excavate the site in order to remove the drums and send them to be incinerated. Once the operation had begun, it was found that many of the drums were no longer intact, and their contents had mixed with the soil (Ref. 12, p. 2). Instead of removing the source of the contamination, Monsanto chose to have a cap installed over the area, leaving the drums in place (Ref. 12, p. 2).

## 4.0 SURFACE WATER MIGRATION PATHWAY

Both components of the Surface Water Migration Pathway are presented here and their respective scores are documented.

### 4.1 OVERLAND/FLOOD MIGRATION COMPONENT

Hazardous substances found in surface waste collected from the sources may mix with runoff during storm events and flow in the direction of the Mississippi River and adjacent wetlands. This migration of hazardous substances poses a threat to the fishery located immediately downstream of the site and to the endangered species and wetlands on and adjacent to the site. Flooding events have already exposed these sensitive environments to hazardous substances, including PCBs. Sediment contamination attributable to the site is present in the Mississippi River adjacent to the site. Discharges of hazardous substances directly into the Mississippi River have also been reported (Ref. 11, pp. 3-6).

#### 4.1.1.1 Definition of Hazardous Substance Migration Path for Overland/flood Component

A levee, which splits this site from north to south, acts as an impedance to overland surface water flow. It does not stop contaminants in the ground water from flowing beneath it to surface water via seeps or direct communication between ground water and the river. Sources located west of the levee, source 3 and 4, are subject to periodic flooding and runoff. The PPE for the hazardous substances in all of the sources, is located along the riverbank, as well as the interface between the Mississippi River and ground water (Ref. 3). The migration pathway continues downstream from the PPE on the Mississippi River for 15 miles, to river mile 162 (Ref. 3).

#### 4.1.2.1 Likelihood of Release

##### 4.1.2.1.1 Observed Release

##### Observed release by direct observation - flooding

Source 3 and 4 were inundated during the 1993 Mississippi River flood resulting in flood waters in direct contact with hazardous substances (Ref 10, p. 7-8). Pictures taken immediately after the flood event show exposed drums and landfill material from source 3 (Ref. 13, p. 1, 10). Surface soil samples collected from source 3 in 1994 show hazardous substances present at the surface, directly after the 1993 flood. Drum samples taken from drums removed from source 3, show the presence of the hazardous substances as late as December 1999 (Ref. 8, p. B-12-B-16).

- Source 3 (Q)

These samples were collected in 1994, following subsidence of the flood waters after the 1993 event.

Hazardous Substance	Evidence	Concentration (µg/kg)**	CRQL (µg/kg)*	Reference
1,1,1-Trichloroethane	X106	18	12.5	25, p. 26
1,2-Dichloroethene	X101	240	13.5	25, p. 23
2,4-Dimethyl phenol	X107	270J	434.2	25, p. 30
Anthracene	X111	62J	464.8	25, p. 38
Aroclor-1248	X107	4800P	434.2	25, p. 42
Aroclor-1254	X101	110,000 P	22,297.3	25, p. 41
Aroclor-1260	X101	83,000	8,918.9	25, p. 40
Benzene	X101	5J	13.5	25, p. 23
Benzo(a)anthracene	X109	89J	452.1	25, p. 34
Benzo(a)pyrene	X109	84J	452.1	25, p. 34
Benzo(b)fluoranthene	X111	110J	464.8	25, p. 38
Cadmium	X101	2,260	6.7	25, p. 16
Chloroform	X102	10J	11.5	25, p. 24
Chromium	X101	3,650	13.5	25, p. 16
Chrysene	X111	110J	464.8	25, p. 38
Cobalt	X101	18.7	67.4	25, p. 16
Copper	X103	1,630	33.6	25, p. 20
Cyanide	X101	3.3	13.5	25, p. 16
Di-n-butyl phthalate	X110	380J	464.8	25, p. 36
Fluoranthene	X109	160J	452.1	25, p. 34
Isophorone	X107	210J	434.2	25, p. 30
Lead	X101	7,690	4.0	25, p. 16
Manganese	X103	1,270	20.2	25, p. 20
Mercury	X101	4.9	0.270	25, p. 16
Phenanthrene	X109	76J	452.1	25, p. 34
Pyrene	X109	170J	452.1	25, p. 34
Toluene	X105	14	13.5	25, p. 25
Trichloroethene	X101	6J	13.5	25, p. 23
Vanadium	X102	16	64.8	25, p. 18
Xylene	X105	14	13.5	25, p. 25

Hazardous Substance	Evidence	Concentration (µg/kg)**	CRQL (µg/kg)*	Reference
Zinc	X103	9,520	26.9	25, p. 20

Notes:

J - Estimated value

P - greater than 25% difference for the detected concentrations between the two columns. The lower of the two results is reported.

\* - For inorganic compounds, µg/L and MDL were used instead of µg/kg and CRQL (Ref. 19).

\*\*While some of the values were qualified during QC review, the qualifiers only effect the accuracy of the quantification, the presence of these substances is not in doubt.

-Drum Samples

These samples were collected between October and December 1999, during the removal of the drums from source 3 (Q).

Hazardous Substance	Evidence	Concentration (mg/kg)*	CRQL(mg/kg)*	Reference
1,1-dichloroethane	D-01	29 J	10	8, p. B-12
1,1,1-trichloroethane	D-01	140	10	8, p. B-12
1,2-dichlorobenzene	D-246	230 J	10	8, p. B-13
1,2-dichloroethene	D-01	160	10	8, p. B-12
1,2,3-trichlorobenzene	D-02	30 J	10	8, p. B-12
1,2,4-trichlorobenzene	D-02	350	10	8, p. B-14
1,2,4-trimethylbenzene	D-246	40,000	10	8, p. B-13
1,3,5-trimethylbenzene	D-246	14,000	10	8, p. B-13
1,4-dichlorobenzene	D-246	30 J	10	8, p. B-14
2-methylnaphthalene	D-112	270 J	330	8, p. B-14
2-methylphenol	D-246	18,600	330	8, p. B-14
2,4-dichlorophenol	D-246	130 J	330	8, p. B-14
2,4-dimethylphenol	D-246	21,400	330	8, p. B-14
2,4,6-trichlorophenol	D-246	34 J	330	8, p. B-14
3,4-methylphenol	D-246	46,200	330	8, p. B-14
4-methyl-2pentanone	D-102	230	10	8, p. B-12
antimony	D-102	60.4	12	8, p. B-15
Aroclor-1248	D-102	1,720	33	8, p. B-16
Aroclor-1254	D-112	2,870	33	8, p. B-16
Aroclor-1260	D-02	1,490	33	8, p. B-16
arsenic	D-01	138	2	8, p. B-15

Hazardous Substance	Evidence	Concentration (mg/kg)*	CRQL(mg/kg)*	Reference
benzene	D-52	6.2 J	10	8, p. B-12
cadmium	D-102	651	1	8, p. B-15
chromium	D-102	7,400	2	8, p. B-15

Hazardous Substance	Evidence	Concentration (mg/kg)*	CRQL(mg/kg)*	Reference
cis-1,2-dichloroethene	D-01	160	10	8, p. B-12
copper	D-02	314	5	8, p. B-15
di-n-butylphthalate	D-102	180 J	330	8, p. B-14
ethylbenzene	D-615	40,000	10	8, p. B-13
isopropylbenzene	D-246	1,400	10	8, p. B-13
lead	D-02	3,740	0.6	8, p. B-15
mercury	D-02	5.84	0.1	8, p. B-15
Methyl ethyl ketone	D-04	10	10	8, p. B-13
n-butylbenzene	D-02	64	10	8, p. B-13
n-propylbenzene	D-246	7,100	10	8, p. B-13
naphthalene	D-395	90,000	330	8, p. B-14
nickel	D-246	403	8	8, p. B-15
p-isopropyltoluene	D-01	88	10	8, p. B-13
phenol	D-246	66,300	330	8, p. B-14
sec-butylbenzene	D-102	55 J	330	8, p. B-13
selenium	D-102	173	1	8, p. B-15
silver	D-02	14.9	2	8, p. B-15
tetrachloroethene	D-01	21 J	10	8, p. B-13
thallium	D-01	10.6	2	8, p. B-15
toluene	D-112	23,000	10	8, p. B-12
trichloroethene	D-112	17,000	10	8, p. B-12
xylene (total)	D-615	58,000	10	8, p. B-12
zinc	D-102	8,870	4	8, p. B-15

Notes:

J- estimated value

\*While some of the values were qualified during QC review, the qualifiers only effect the accuracy of the quantification, the presence of these substances is not in doubt.

\*\* Adjusted CRQL/CRDL for substance (Ref. 19).



#### Observed Release by Chemical Analysis

Sediment samples collected from the Mississippi River adjacent to the site show elevated concentrations of hazardous substances as compared to upstream samples. These hazardous substances are not only found in sources 3 and 4 (Q and R) which are adjacent to the river, but two are also found in Source 2 (P) located on the east side of the levee. The following sediment samples were collected between October 24, 2000 and November 3, 2000, by Solutia, Inc. Background samples were collected immediately upstream of the site to minimize influence from the site. Hazardous substances were not detected in the background samples.

#### - Background Concentrations:

Sample ID	Sample Medium	Date	Reference
SD-POP-90	Sediment	11/2/2000	23, p. 9, 10, 16
SD-1-50	Sediment	11/1/2000	23, p. 7, 8, 22
SD-1-150	Sediment	11/1/2000	23, p. 7, 8, 22
SD-1-300	Sediment	11/1/2000	23, p. 7, 8, 22, 23

Hazardous Substance	Background Concentrations (µg/L)*				Sample ** Quantitation Limit (µg/L)
	SD-POP-90	SD-1-50	SD-1-150	SD-1-300	
Reference 23	p. 9, 17-20	p. 7, 26, 29, 30, 35	p. 7, 27, 31, 32, 36	p. 7, 28, 33, 34, 37	
Chlorobenzene	ND	ND	ND	ND	7.1
4-Chloroaniline	ND	ND	ND	ND	410
1,4-Dichlorobenzene	ND	ND	ND	ND	410
4,4'-DDD	ND	ND	ND	ND	2.1

The last group of numbers in the sample identification number indicate the distance from the shoreline the sample was collected. Fine sand sediments generally occur within 100 feet of the riverbank and coarse sand is found greater than 100 feet from the bank (Ref. 23, p. 1). There are background and release samples from both types of sediment presented for comparison. The background samples were collected during the same event and under the same conditions as the contaminated samples. None of the hazardous constituents listed below were found in any significant concentration in the upstream samples as indicated by the tables (Ref. 23, p. 1). Areal extent of contaminated sediments in the Mississippi River generally begins upstream near the northern boundary of Source 4 and extends downstream beyond the southern boundary of Source 4. All background samples were collected upstream of Source 4 (Ref. 23, p. 1).

\* This data was submitted by the potential responsible parties for regulatory purposes.

\*\* Adjusted CRQL/CRDL for substance (Ref. 19).

- Contaminated Samples:

Sample ID	Sample Medium	Date	Reference
SD-2-50	Sediment	11/1/2000	23, p. 7, 8, 21
SD-2-150	Sediment	11/1/2000	23, p. 7, 8, 21
PD-8-60	Sediment	10/26/2000	23, p. 4-6, 42
PDA-5-R-60	Sediment	10/24/2000	23, p. 4-6, 38
SD-5-150	Sediment	11/3/2000	23, p. 11, 12, 47
SD-5-315	Sediment	11/3/2000	23, p. 11, 12, 47
PDA-2-60	Sediment	10/25/2000	23, p. 4-6, 42
SD-6-90	Sediment	11/3/2000	23, p. 11, 12, 46
SD-7-150	Sediment	11/3/2000	23, p. 13, 14, 48

Hazardous Substance	Evidence	Concentration (µg/kg)*	Background	Detection Limit	Reference
Chlorobenzene	SD-2-50	6.5	ND	5.9	23, p. 7, 24
	SD-2-150	390	ND	300	23, p. 7, 25
	PD-8-60	700	ND	340	23, p. 4, 44
	PDA-5-R-60	450	ND	260	23, p. 4, 39
	SD-5-150	6,700	ND	320	23, p. 11, 51
	SD-5-315	3,100	ND	260	23, p. 11, 50
	PDA-2-60	10,000	ND	1,100	23, p. 4, 43
	SD-6-90	8	ND	5.6	23, p. 11, 49
	SD-7-150	1,600	ND	270	23, p. 13, 52
4-Chloroaniline	PDA-5-R-60	3,300	ND	780	23, p. 4, 40
	PDA-2-60	720	ND	580	23, p. 4, 45
1,4-Dichlorobenzene	SD-5-150	1,700	ND	430	23, p. 11, 53
4,4'-DDD	PDA-5-R-60	14	ND	4.0	23, p. 4, 41

\* This data was submitted by the potential responsible parties for regulatory purposes.

These samples also show that 2-chlorophenol, 2,4-dichlorophenol, phenol, delta-BHC, 1,2-dichlorobenzene, 1,2-dichloroethane, xylenes, ethylbenzene, benzene, methoxychlor, and PCBs were found in the river sediments adjacent to the site (Ref. 20, pp. 9-19).

### Attribution

All the hazardous substances in the observed release by chemical analysis are present in at least one uncontained source at the site. Sources 1, 2, 3, and 4 were active landfills or sources associated with industrial waste water treatment plants which received waste from the Commercial Acid Company (now called the W. G. Krummrich Plant, a chemical manufacturing facility of Solutia Incorporated) (Refs. 12, p. 1; 14, pp. 1-3). Monsanto has produced a wide variety of chemicals, both organic and inorganic (Ref. 12, p. 1). According to a 1992 RCRA Facility Assessment Report, the following products and wastes have been or are presently generated at the facility: Spent halogenated and non-halogenated solvents, mercury contaminated wastes, chlorobenzenes, nitrochlorobenzenes and benzene compounds, phenols, phosphorus, polychlorinated biphenyl (PCB) compounds, dioxins, aromatic nitro compounds, amines and nitroamines, agent orange, maleic anhydride, acids and caustics (Ref. 12, p. 1). In addition, the landfills contain most of the same hazardous substances which have been found in the release samples in the ground water beneath the landfills. The ground water below the Sauget Area 2 site, appears to be contaminated from sources located on-site. Samples collected from the perimeter of the site do not show elevated levels of contamination like those collected from the main portion of the site (Ref. 14, p. 14).

### Hazardous Substances Released

1,1,1-Trichloroethane	Arsenic	Manganese
1,2-Dichloroethane	Benzene	Mercury
1,2-Dichlorobenzene	Benzo(a)anthracene	n-Butylbenzene
1,2-Dichloroethene	Benzo(a)pyrene	n-Propylbenzene
1,2,3-Trichlorobenzene	Benzo(b)fluoranthene	Nickel
1,2,4-Trichlorobenzene	Cadmium	p-Isopropyltoluene
1,2,4-Trimethylbenzene	Chlorobenzene	Phenanthrene
1,3,5-Trimethylbenzene	Chloroform	Phenol
2,4-Dimethyl phenol	Chromium	Pyrene
2,4,6-Trichlorophenol	Chrysene	Sec-butylbenzene
3,4-Methylphenol	cis-1,2-Dichloroethene	Selenium
4-Chloroaniline	Cobalt	Silver
1,4-Dichlorobenzene	Copper	Thallium
4-Methyl-2-Pentanone	Cyanide	Toluene
4,4'-DDD	Di-n-butyl phthalate	Trichloroethene
Anthracene	Ethyl benzene	Vanadium
Antimony	Fluoranthene	Xylene (total)
Aroclor-1248	Isophorone	Zinc
Aroclor-1254	Lead	
Aroclor-1260		

Surface Water Observed Release Factor Value: 550

#### 4.1.2.3 Drinking Water Threat Targets

There are no documented drinking water targets eligible for scoring.

#### 4.1.3.2 Human Food Chain Threat Waste Characteristics

The Food Chain Threat is being scored because people have been known to fish in the vicinity of the site. According to the Illinois Department of Conservation (IDOC), the Resource Inventory for the Mississippi River at river miles 178-162 shows fishing areas as well as sport fishing areas in this reach (Ref. 6, p. 5-5).

##### 4.1.3.2.1 Toxicity/Persistence/Bioaccumulation

Hazardous Substance	Source No.	Toxicity Factor Value	Persistence Factor Value*	Toxicity/Persistence Factor Value (Table 4-16)	Bio-accumulation Value**	Ref.
1,1,1-Trichloroethane	5, OR	1	.4	.4	5	2, p. B-19
1,2 Dichloroethane	4	100	.4	40	5	2, p. B-7
1,2-Dichlorobenzene	4, OR	10	.4	4	50	2, p. B-7
1,2,4-Trichlorobenzene	3, 4, OR	100	.4	40	500	2, p. B-19
1,4-Dichlorobenzene	2, 4, OR	10	.4	.4	50	2, p. B-7
2-Butanone	4	10	.4	4	.5	2, p. B-13
2-Chlorophenol	4	100	.4	40	500	2, p. B-5
2-Methyl naphthalene	3, 5, OR	NA	.4	ND	5000	2, p. B-14
2,4-Dichlorophenol	4, OR	1000	.0007	.7	50	2, p. B-8
2,4-Dimethyl phenol	4, OR	100	1	100	500	2, p. B-8
2,4,6-Trichlorophenol	4, OR	10	1	10	500	2, p. B-20
4 - Nitroaniline	4	1	.4	.4	5	2, p. B-15
4-Chloroaniline	2, 3, 4, OR	1000	.07	70	5	2, p. B-5
4-Methyl-2-Pentanone	4, 5, OR	100	.4	40	5	2, p. B-13
4-Methyl phenol	2, 4	100	.4	40	5	2, p. B-6
4,4'-DDD	3, 4, OR	100	1	100	50,000	2, p. B-6
4,4'-DDE	2, 3, 4	100	1	100	50,000	2, p. B-6
4,4'-DDT	3, 5	1000	1	1000	50,000	2, p. B-6
Aldrin	2, 4	10,000	1	10,000	50,000	2, p. B-1
Alpha-BHC	4, OR	10,000	1	10,000	500	2, p. B-12
Anthracene	OR	10	1	10	5,000	2, p. B-2
Aroclor-1016	3	10,000	1	10,000	50,000	2, p. B-16
Aroclor-1232	3	10,000	1	10,000	50,000	2, p. B-16
Aroclor-1242	2, 3	10,000	1	10,000	50,000	2, p. B-16

Hazardous Substance	Source No.	Toxicity Factor Value	Persistence Factor Value*	Toxicity/Persistence Factor Value (Table 4-16)	Bio-accumulation Value**	Ref.
Aroclor-1248	2, 3, 5, OR	10,000	1	10,000	50,000	2, p. B-16
Aroclor-1254	2, 3, 5, OR	10,000	1	10,000	50,000	2, p. B-16
Aroclor-1260	3, 5, OR	10,000	1	10,000	50,000	2, p. B-16
Arsenic	OR	10,000	1	10,000	5	2, p. B-2
Barium	3	10,000	1	10,000	.5	2, p. B-2
Benzene	2, 3, 4, 5, OR	100	.4	40	5000	2, p. B-2
Benzo(a)pyrene	OR	10,000	1	10,000	50,000	2, p. B-2
Benzo(a)anthracene	3, OR	1,000	1	1,000	50,000	2, p. B-2
Benzo(b)fluoranthene	3, OR	100	1	100	50,000	2, p. B-3
Beryllium	3	10,000	1	50	50	2, p. B-3
Cadmium	3, OR	10,000	1	10,000	5000	2, p. B-4
Chlorobenzene	3, 4, OR	100	.0007	.07	50	2, p. B-5
Chloroform	4, 5, OR	100	.4	40	5	2, p. B-5
Chromium	2, 3, OR	10,000	1	10,000	5	2, p. B-5
Chrysene	3, OR	10	1	10	500	2, p. B-5
Cobalt	3, OR	1	1	1	.5	2, p. B-6
Copper	2, 3, OR	NA	1	ND	50,000	2, p. B-6
Cyanide	OR	100	.4	40	.5	2, p. B-6
Delta-BHC	3, 4	1	1	1	500	2, p. B-12
Di-n-butyl phthalate	5, OR	10	1	10	5000	2, p. B-7
Dieldrin	5	10,000	1	10,000	50,000	2, p. B-8
Diethylphthalate	3	1	1	1	500	2, p. B-8
Endosulfan I	2, 3, 4, 5	100	1	100	500	2, p. B-9
Endosulfan II	2, 3, 5	100	1	100	500	2, p. B-9
Endosulfan sulfate	3	100	1	100	500	2, p. B-9
Endrin	3, 5	10,000	1	10,000	5000	2, p. B-10
Endrin aldehyde	3, 5	NA	.4	NA	500	2, p. B-10
Endrin ketone	4	100	.4	40	.5	2, p. B-10
Ethyl benzene	2, 3, 4, 5, OR	10	.4	4	50	2, p. B-10
Fluoranthene	3, 5, OR	100	1	100	5,000	2, p. B-10
Gamma-BHC	3	10,000	1	10,000	500	2, p. B-13
Gamma-chlordane	3, 4, 5	10	1	10	50,000	2, p. B-4

Hazardous Substance	Source No.	Toxicity Factor Value	Persistence Factor Value*	Toxicity/Persistence Factor Value (Table 4-16)	Bio-accumulation Value**	Ref.
Heptachlor	3, 4	1000	1	1000	5000	2, p. B-11
Heptachlor epoxide	3, 4	10,000	1	10,000	5	2, p. B-11
Isophorone	5, OR	10	1	10	5	2, p. B-13
Lead	2, 3, OR	10,000	1	10,000	50	2, p. B-13
Manganese	1, 3, OR	10,000	1	10,000	.5	2, p. B-13
Mercury	OR	10,000	.4	4000	50,000	2, p. B-13
Methoxychlor	4	100	1	100	50,000	2, p. B-13
N - Hexane	4	10	.4	4	500	2, p. B-12
N-Nitrosodiphenylamine	3	10	1	10	500	2, p. B-15
Napthalene	3, 5, OR	100	.4	40	500	2, p. B-14
Nickel	2, 3, OR	10,000	1	10,000	.5	2, p. B-14
Nitrobenzene	4	1000	1	1000	5	2, p. B-15
Pentachlorophenol	3, 4	100	1	100	500	2, p. B-16
Phenanthrene	3, 5, OR	NA	1	ND	50	2, p. B-16
Phenol	2, 3, 4, OR	1	1	1	5	2, p. B-16
Pyrene	3, 5, OR	100	1	100	50	2, p. B-17
Silver	OR	100	1	100	50	2, p. B-18
Tetra Chloroethane	4	10	1	10	5	2, p. B-18
Toluene	2, 3, 4, 5, OR	10	.4	4	50	2, p. B-19
Trichloroethene	5, OR	10	.4	4	50	2, p. B-19
Vanadium	1, 2, 3, OR	100	1	100	.5	2, p. B-20
Xylene (total)	2, 3, 4, 5, OR	1	.4	.4	50	2, p. B-20
Zinc	2, 3, OR	10	1	10	500	2, p. B-20

Notes:

- \* Persistence value for Rivers
- \*\* Bioaccumulation factor value for freshwater

The hazardous substances with the highest Toxicity/Persistence/Bioaccumulation value are:

Aldrin	Aroclor-1260
Aroclor-1016	Benzo(a)pyrene
Aroclor-1232	Dieldrin
Aroclor-1242	
Aroclor-1248	
Aroclor-1254	

Toxicity/Persistence/Bioaccumulation Factor Value:  $5 \times 10^8$

#### 4.1.3.2.2 Hazardous Waste Quantity

Source No.	Source Type	Source Hazardous Waste Quantity
3 (Q)	Landfill	2883.9
4 (R)	Landfill	317.12

Sum of Values: 3201.02

Hazardous Waste Quantity Factor Value: 100  
(Ref. 1, Table 2-6)

#### 4.1.3.2.3 Waste Characteristics Factor Category Value

Toxicity/Persistence Factor Value: 10,000  
Hazardous Waste Quantity Factor Value: 100  
Bioaccumulation value: 50,000

Toxicity/Persistence Factor Value x Hazardous Waste Quantity Factor Value:  $1 \times 10^6$   
(10,000 x 100 =  $1 \times 10^6$ )  
(max  $1 \times 10^6$ )

Bioaccumulation potential factor value x  
(Toxicity/Persistence Factor Value x Hazardous Waste Quantity Factor Value) :  $5 \times 10^{10}$   
(50,000 x  $1 \times 10^6$  =  $5 \times 10^{10}$ )  
(Max  $1 \times 10^{12}$ )

Waste Characteristics Factor Category Value: 320  
(Ref. 1, Table 2-7)

#### 4.1.3.3 Human Food Chain Threat Targets

##### Actual Human Food Chain Contamination

Hazardous substances having a bioaccumulation potential factor value of 500 or greater were present in the observed release by direct observation and by chemical analysis of sediment samples. A portion of the Mississippi River Fishery is also located within the area of direct observation, therefore the fishery is subject to actual contamination (figure 1; Refs. 1, Sec. 4.1.3.3; 28, p. 1). The hazardous substances released during the 1993 flood and identified by the chemical analysis of sediments, are listed previously in section 4.1.2.1.1 of this document.

##### Level I Concentrations

No level I concentrations have been identified for the Human Food Chain Threat.

##### Level II Concentrations

Actual contamination has been established for the Mississippi River fishery by Direct Observation, and chemical analysis of sediment samples (Ref. 1, Sec. 4.1.3.3)

##### Most Distant Level II Sample

Sample ID: SD-7-150

Distance from the PPE: Sample located approximately 2000 feet downstream from uppermost PPE

Reference: 23, pp. 4, 1-18, 1-19

##### Level II Fisheries

Identity of Fishery	Extent of Level II Fishery (Relative to PPE)	Refs.
Mississippi River	2000 feet	3, map 1; 28

#### 4.1.3.3.1 Food Chain Individual

Level I/Level II/or Potential: Level II

Hazardous Substance: PCBs

Bioaccumulation Potential: 50,000

Level II contamination can be established for the portion of the fishery located between the northern most boundary of the site and sample SD-7-150 (figure 1; Ref. 23, p. 4).

Identity of Fishery	Type of Surface Water Body	Dilution Weight (D <sub>i</sub> ) (Table 4-13)	Refs.
Mississippi River	Very Large River	0.00001	27, p. 3

Food Chain Individual Factor Value: 45



#### 4.1.3.3.2 Population

The Sauget Area 2 site is located along the Illinois bank of the Mississippi River at river mile 178 (Ref. 3, p. 1). Although the entire river is fished, the river adjacent to and immediately downstream of the site is mostly bank fished. Many species exist within the river, however, the most popular are catfish, drum and carp (Ref. 28, p. 1). While it is known that the area is used as a fishery, the exact number of fish caught every year is unknown (Ref. 28, p. 1). Therefore, greater than zero pounds has been assigned to the annual production category for scoring purposes.

#### 4.1.3.3.2.2 Level II Concentrations

Identity of Fishery	Annual Production (pounds)	References	Human Food Chain Population Value (Table 4-18)
Mississippi River	> 0	28	0.03

Level II Concentrations Factor Value: 0.03

#### 4.1.4.2 Environmental Threat Waste Characteristics

Hazardous substances in the soil and ground water at the site pose a threat to the wetlands on site and adjacent to the Mississippi River and the endangered species who inhabit the area.

##### 4.1.4.2.1 Ecosystem Toxicity/Persistence/Bioaccumulation

Hazardous Substance	Source No.	Ecosystem Toxicity Factor Value	Persistence Factor Value*	Ecosystem Toxicity/Persistence Factor Value (Table 4-21)	Bio-accumulation Value**	Ref.
1,1,1-Trichloroethane	5, OR	10	.4	4	5	2, p. B-19
1,2 Dichloroethane	4	1	.4	.4	5	2, p. B-7
1,2-Dichlorobenzene	4, OR	100	.4	40	50	2, p. B-7
1,2,4-Trichlorobenzene	3, 4, OR	1,000	.4	400	500	2, p. B-19
1,4-Dichlorobenzene	2, 4, OR	100	.4	40	50	2, p. B-7
2-Chlorophenol	4	100	.4	40	500	2, p. B-5
2-Methyl naphthalene	3, 5, OR	1,000	.4	400	5,000	2, p. B-14
2,4-Dichlorophenol	4, OR	100	.0007	.07	500	2, p. B-8
2,4-Dimethyl phenol	4, OR	100	1	100	500	2, p. B-8
2,4,6-Trichlorophenol	4, OR	1,000	1	1,000	50,000	2, p. B-20
4 - Nitroaniline	4	10	.4	4	5	2, p. B-15
4-Chloroaniline	2, 3, 4, OR	10,000	.07	700	5	2, p. B-5
4,4'-DDD	3, 4, OR	10,000	1	10,000	50,000	2, p. B-6
4,4'-DDE	2, 3, 4	10,000	1	10,000	50,000	2, p. B-6
4,4'-DDT	3, 5	10,000	1	10,000	50,000	2, p. B-6
Aldrin	2, 4	10,000	1	10,000	50,000	2, p. B-1
Alpha-BHC	4	100	1	100	500	2, p. B-12
Anthracene	OR	10,000	1	10,000	5,000	2, p. B-2
Aroclor-1016	3	10,000	1	10,000	50,000	2, p. B-16
Aroclor-1232	3	10,000	1	10,000	50,000	2, p. B-16
Aroclor-1242	2, 3	10,000	1	10,000	50,000	2, p. B-16
Aroclor-1248	2, 3, 5, OR	10,000	1	10,000	50,000	2, p. B-16
Aroclor-1254	2, 3, 5, OR	10,000	1	10,000	50,000	2, p. B-16
Aroclor-1260	3, 5, OR	10,000	1	10,000	50,000	2, p. B-16
Arsenic	OR	10	1	10	500	2, p. B-2
Barium	3	1	1	1	.5	2, p. B-2
Benzene	2, 3, 4, 5, OR	100	.4	40	500	2, p. B-2

Hazardous Substance	Source No.	Ecosystem Toxicity Factor Value	Persistence Factor Value*	Ecosystem Toxicity/ Persistence Factor Value (Table 4-21)	Bio- accumulation Value**	Ref.
Benzo(a)pyrene	OR	10,000	1	10,000	50,000	2, p. B-2
Benzo(a)anthracene	3, OR	10,000	1	10,000	50,000	2, p. B-2
Benzo(b)fluoranthene	3, OR	NA	1	ND	50,000	2, p. B-3
Beryllium	3	NA	1	ND	50	2, p. B-3
Beta-BHC	5	NA	1	ND	500	2, p. B-12
Cadmium	3, OR	1,000	1	1,000	5,000	2, p. B-4
Chlorobenzene	3, 4, OR	1,000	.0007	.7	50	2, p. B-5
Chloroform	4, 5, OR	10	.4	4	5	2, p. B-5
Chromium	2, 3, OR	100	1	100	5	2, p. B-5
Chrysene	3, OR	1,000	1	1,000	5,000	2, p. B-5
Cobalt	3, OR	NA	1	ND	5,000	2, p. B-6
Copper	2, 3, OR	100	1	100	50,000	2, p. B-6
Cyanide	OR	1,000	.4	400	.5	2, p. B-6
Delta-BHC	3, 4	NA	1	ND	500	2, p. B-12
Di-n-butyl phthalate	5, OR	1,000	1	1,000	5,000	2, p. B-7
Dieldrin	5	10,000	1	10,000	50,000	2, p. B-8
Diethylphthalate	3	10	1	10	500	2, p. B-8
Endosulfan I	2, 3, 4, 5	10,000	1	10,000	50,000	2, p. B-9
Endosulfan II	2, 3, 5	10,000	1	10,000	50,000	2, p. B-9
Endosulfan sulfate	3	NA	1	ND	500	2, p. B-9
Endrin	3, 5	10,000	1	10,000	50,000	2, p. B-10
Endrin aldehyde	3, 5	NA	.4	ND	500	2, p. B-10
Endrin ketone	4	NA	.4	ND	.5	2, p. B-10
Ethyl benzene	2, 3, 4, 5, OR	100	.4	40	50	2, p. B-10
Fluoranthene	3, 5, OR	10,000	1	10,000	500	2, p. B-10
Gamma-chlordane	3, 4, 5	10,000	1	10,000	500	2, p. B-4
Heptachlor	3, 4	10,000	1	10,000	50,000	2, p. B-11
Heptachlor epoxide	3, 4	10,000	1	10,000	50,000	2, p. B-11
Isophorone	5, OR	1	1	1	5	2, p. B-13
Lead	2, 3, OR	1,000	1	1,000	5,000	2, p. B-13
Manganese	1, 3, OR	NA	1	ND	50,000	2, p. B-13
Mercury	OR	10,000	.4	4,000	50,000	2, p. B-13

Hazardous Substance	Source No.	Ecosystem Toxicity Factor Value	Persistence Factor Value*	Ecosystem Toxicity/Persistence Factor Value (Table 4-21)	Bio-accumulation Value**	Ref.
Methoxychlor	4	10,000	1	10,000	50,000	2, p. B-13
N - Hexane	4	100	.4	40	500	2, p. B-12
N-Nitrosodiphenylamine	3	100	1	100	500	2, p. B-15
Naphthalene	3, 5, OR	1,000	.4	400	500	2, p. B-14
Nickel	2, 3, OR	10	1	10	500	2, p. B-14
Nitrobenzene	4	100	1	100	5	2, p. B-15
Pentachlorophenol	3, 4	100	1	100	5,000	2, p. B-16
Phenanthrene	3, 5, OR	1,000	1	1,000	5,000	2, p. B-16
Phenol	2, 3, 4, OR	10,000	1	10,000	5	2, p. B-16
Pyrene	3, 5, OR	10,000	1	10,000	50	2, p. B-17
Silver	OR	10,000	1	10,000	50	2, p. B-18
Tetra Chloroethane	4	100	1	100	5	2, p. B-18
Toluene	2, 3, 4, 5, OR	100	.4	40	50	2, p. B-19
Vanadium	1, 2, 3, OR	NA	1	ND	.5	2, p. B-20
Xylene (total)	2, 3, 4, 5, OR	100	.4	40	50	2, p. B-20
Zinc	2, 3, OR	10	1	10	500	2, p. B-20

Notes:

- \* Persistence value for Rivers
- \*\* Environmental Bioaccumulation factor value for freshwater

The substances which document the highest Ecosystem Toxicity/Persistence/Bioaccumulation value include:

4,4'-DDD	Benzo(a)pyrene
4,4'-DDE	Benzo(a)anthracene
4,4'-DDT	Dieldrin
Aldrin	Endosulfan I
Aroclor-1016	Endosulfan II
Aroclor-1232	Endrin
Aroclor-1242	Heptachlor
Aroclor-1248	Heptachlor epoxide
Aroclor-1254	Methoxychlor
Aroclor-1260	

Ecosystem Toxicity/Persistence/Bioaccumulation Factor Value:  $5 \times 10^8$

#### 4.1.4.2.2. Hazardous Waste Quantity

Source No.	Source Type	Source Hazardous Waste Quantity
3 (Q)	Landfill	2883.9
4 (R)	Landfill	317.12

Sum of Values: 3201.02

Hazardous Waste Quantity Factor Value: 100  
(Ref. 1, Table 2-6)

#### 4.1.4.2.3. Waste Characteristics Factor Category Value

Ecosystem Toxicity/Persistence Factor Value: 10,000

Hazardous Waste Quantity Factor Value: 100

Bioaccumulation value: 50,000

Ecosystem Toxicity/Persistence Factor Value x Hazardous Waste Quantity Factor Value:  $1 \times 10^6$

$(10,000 \times 100 = 1 \times 10^6)$

(max  $1 \times 10^8$ )

Ecosystem Bioaccumulation potential factor value x

(Ecosystem Toxicity/Persistence Factor Value x Hazardous Waste Quantity Factor Value) :  $5 \times 10^{10}$

$(50,000 \times 1 \times 10^6 = 5 \times 10^{10})$

(Max  $1 \times 10^{12}$ )

Waste Characteristics Factor Category Value: 320  
(Ref. 1, Table 2-7)

#### 4.1.4.3 Environmental Threat Targets

Environmental targets include sensitive habitats for six threatened or endangered species of birds and wetlands located within source 4. These species were identified by the Illinois Department of Natural Resources as nesting or foraging within the Sauget Area 2 site (Ref. 15, p. 2). The Palustrine wetlands were identified by the Illinois Department of Conservation (Ref. 20, p. 14). The wetlands in Source 3 contain vegetation consistent with that found in wetlands of this type, such as the Eastern Cottonwood, Black Willow, Water Plantain and Potamogeton nodosus (Ref. 20, p. 5, 14, 15, 20).

##### Most Distant Level II Sample

Sample ID: SD-7-150

Distance from the PPE: Sample located approximately 2000 feet downstream from uppermost PPE

Reference: 23, pp. 4, 1-18, 1-19

#### 4.1.4.3.1 Sensitive Environments

##### 4.1.4.3.1.1. Level I Concentrations

No level I concentrations have been identified for the Environmental Threat.

##### 4.1.4.3.1.2. Level II Concentrations

Actual contamination has been established for the Mississippi River fishery by Direct Observation, therefore Level II Contamination has been assigned (Ref. 1, Sec. 4.1.4.3.1)

##### Sensitive Environments

Type of Surface Water Body	Sensitive Environment *	References	Sensitive Environment Value (Table 4-23)
Wetlands	Bald Eagle Habitat	15, p. 2; 29, p. 1	75 - Federal threatened
Wetlands	Common Moorhen Habitat	15, p. 2; 29, p. 5	50 - State threatened
Wetlands	Black-crowned Night Heron Habitat	15, p. 2; 29, p. 6	50 - State endangered
Wetlands	Snowy Egret Habitat	15, p. 2; 29, p. 6	50 - State endangered
Wetlands	Little Blue Heron Habitat	15, p. 2; 29, p. 6	50 - State endangered
Wetlands	Yellow-crowned Night Heron Habitat	15, p. 2; 29, p. 6	50 - State endangered

\* There is no documentation indicating the presence of endangered or threatened plants in the area. It is unclear if this omission is due to the lack of documentation of plant species or the lack of sensitive species within the area.

Sum of Level II Sensitive Environments Value: 325

### Wetlands

Type of Surface Water Body	Wetland Frontage (miles)	References	Wetlands Value (Table 4-24)
Very Large River	3.2 mi*	Figure 1; 20, p. 14	100

\* This number was determined by measuring the perimeter of the wetland located in Source 3 (Figure 1). Most of the Source contains soils that have been classified as those found in wetlands (Ref. 1, Section 4.1.4.3.1.2; 20, p. 14, 15).

Sum of Level II Sensitive Environments Value + Wetlands Value: 425

Environmental Threat Targets Factor Category Value: 425

## **4.2 Ground Water to Surface Water Migration Component**

The ground water located beneath the site is contaminated with hazardous substances linked to the sources at the surface. This ground water, as explained below, is allowed to flow freely below the site and the levee, toward the Mississippi River during times of normal and low flow (Ref. 17, p. F-1). This migration of hazardous substances poses a potential threat to the fishery located immediately downstream of the site and to the endangered species and wetlands on and adjacent to the site.

### **4.2.1.2 Definition of Hazardous Substance Migration Path for Ground Water to Surface Water Component**

The levee stops direct overland flow from the source areas on the east side of the levee from reaching the river and stops the flooding of the river from reaching them. However, the sand levee does not stop migration of subsurface water and allows hazardous substances, from the sources on the east side of the levee, to migrate under and through the levee to the river either directly or via seeps and overland flow. Leachate seeps have been identified near the river edge as evidence of this flow (Ref. 7, p. R-15). As stated in the HRS, to be an eligible ground water to surface water migration pathway, a portion of the surface water must be within 1 mile of one or more sources at the site having a ground water containment factor value greater than 0 (Ref. 1, sec. 3.1.2.1, 4.2.1.1). As documented earlier in this report, all five sources at the site have containment factors greater than 0 and are all located within 1 mile of the Mississippi River (Ref. 3, p. 1). Also, there are to be no discontinuities between the upper most aquifer and the surface water, and the uppermost aquifer must be at or above the bottom of the surface water (Ref. 1, sec. 4.2.1.1). As stated below, the ground water at the site is in direct contact with the Mississippi River, and even reverses flow during elevated river stages (Ref. 17, p. F-2).

### **4.2.2.1 Likelihood of Release**

To establish an observed release to the ground water to surface water component of the surface water pathway, an observed release to the ground water pathway must first be established (Ref. 1, Sec. 4.2.1.3). The following section describes the contaminated aquifer and documents evidence of an observed release to the ground water pathway by chemical analysis. The ground water below the Sauget Area 2 site, is contaminated from sources located on-site. Samples collected from the perimeter of the site do not show elevated levels of contamination like those collected from the main portion of the site (Ref. 14, p. 14). It is believed that contamination from each of the sources has combined in the ground water to form a plume which can not be identified with a single source. Due to the link between the ground water in the area of the site and the surface water, as shown below, it is also believed that the contamination found in the Mississippi River sediments was deposited by the migration of ground water.

#### **4.2.2.1.1 Observed Release to Ground Water**

Strata Being Evaluated:

The hydrogeology in the Sauget area is characterized primarily by glacial and alluvium deposits overlying bedrock. The depth of the alluvial deposits in the St. Louis District is rather variable, ranging from about 75 to 200 feet, with an average depth of about 125 feet (Ref. 18, p. 12). These unconsolidated deposits have been split into 3 zones of transmissivities to simplify the flow system (Ref. 16, p. 3). The surficial deposit of unconsolidated alluvium, the Cahokia Alluvium, extends 40 feet below the surface. This alluvium has been described as poorly sorted, fine-grained, gray and brown silty sand with local sand and clay lenses (Ref. 16, p. 3). This has also been named the water-table zone of the aquifer system (Ref. 16, p. 3-4). The water-table zone reaches downward approximately 30 feet to the top of the Henry Formation (Ref. 16, p. 4). Flow within the water-table zone is generally westward toward the river, except for a slight mound below Source 4 (R) which causes flow to be south-easterly until it is overtaken by the westward gradient (Ref. 17, p. F-1, F-2).

Prior to 1980, ground water movement was mainly away from the river toward plant process area production wells used by local industries, including the Monsanto-Krummrich facility. However, when these wells were abandoned, natural flow conditions resumed in the direction of the Mississippi River (Ref. 16, p. 6). Ground water movement in this region is westward, toward the Mississippi River during normal river stage in all three zones (Ref. 17, p. F-1). During normal river stages, the Mississippi river is a major ground water discharge boundary for the aquifer. During high river stages (when the water level in the river rises above the ground water table), ground water flow becomes



reversed. Ground water flows eastward until it reaches an equal westward regional gradient. This stagnation point is generally between Source 4 (R) and the levee, depending on the magnitude of the westward flow and the river stage (Ref. 17, p. F-2). The levee, which splits this site from north to south, may act as an impedance to surface water flow, it does not stop contaminants in the ground water from flowing beneath it to surface water via seeps or direct communication between ground water and the river. During normal conditions, the hazardous substances may migrate through and below the surficial levee from Sources 1, 2, 5, and 6 (O, P, and S).

#### Chemical Analysis

Ground water samples documenting an observed release were taken at the site in May of 1999. These samples were taken between 8 and 28 feet below the surface\* in the Cahokia Alluvium and the watertable zone of the ground water.

#### - Background Concentrations:

The background samples were collected at the same time as the release samples and are located up gradient of the release samples (Ref. 14, p. 14). Background samples have been included to determine the extent of the plume and to show that elevated levels of hazardous substances are not emanating from another source off-site or found naturally in the area.

Sample ID	Screened Interval (feet bgs)*	Date	Reference
G108	16 - 20	5-25-99	14, p. 14, 21
G 109	17 - 19	5-27-99	14, p. 15, 21
G101	18 - 20	5-10-99	12, p. 9, 11

\* Elevation in the vicinity of the site is approximately 400 feet above sea level and varies within 5 feet on either side of the levee. Therefore, the difference in the elevation of the wells is insignificant with respect to the screened intervals. The levee itself is 12 to 18 feet higher than the surrounding area; however, there were no samples taken from the levee (Ref. 3).

Hazardous Substance	Background Concentrations (µg/L)			Sample Quantitation Limit (µg/L)*	Reference
	G108 (Ref. 14, p. 14)	G109 (Ref. 14, p. 15)	G101 (Ref. 12, p. 9)		
1,1,1-Trichloroethane	ND	ND	ND	10	9, p. B-58, B-64, D-11
1,2-Dichlorobenzene	ND	ND	19	10	9, p. B-60, B-66, D-12
1,4-Dichlorobenzene	ND	ND	ND	10	9, p. B-60, B-66, D-12
2,4,6-Trichlorophenol	ND	ND	ND	10	9, p. B-60, B-66, D-12
2,4-Dichlorophenol	ND	ND	ND	10	9, p. B-60, B-66, D-12
2,4-Dimethyl phenol	ND	ND	ND	10	9, p. B-60, B-66, D-12
2-Butanone	ND	ND	ND	10	9, p. B-58, B-64, D-11
2-Chlorophenol	ND	ND	ND	10	9, p. B-60, B-66, D-12
2-Methylnaphthalene	ND	ND	ND	10	9, p. B-60, B-66, D-12
4,4'-DDE	.015 J (.15)	.0044J (.044)	ND	0.1	9, p. B-63, B-69, D-15

Hazardous Substance	Background Concentrations (µg/L)			Sample Quantitation Limit (µg/L)*	Reference
	G108 (Ref. 14, p. 14)	G109 (Ref. 14, p. 15)	G101 (Ref. 12, p. 9)		
4,4'-DDT	ND	ND	ND	0.1	9, p. B-63, B-69, D-15
4-Chloroaniline	ND	ND	ND	10	9, p. B-60, B-66, D-12
4-Methyl-2-Pentanone	ND	ND	ND	10	9, p. B-58, B-64, D-11
4-Methyl phenol	ND	ND	ND	10	9, p. B-60, B-66, D-12
4-Nitroaniline	ND	ND	ND	25	9, p. B-61, B-67, D-13
Aldrin	ND	ND	ND	0.05	9, p. B-63, B-69, D-15
Aroclor-1242	ND	.32J (3.2)	ND	1	9, p. B-63, B-69, D-15
Aroclor-1248	ND	.2J (2)	ND	1	9, p. B-63, B-69, D-15
Aroclor-1254	.55 J (5.5)	ND	ND	1	9, p. B-63, B-69, D-15
Benzene	ND	ND	ND	10	9, p. B-58, B-64, D-11
Chlorobenzene	ND	ND	ND	10	9, p. B-58, B-64, D-11
Chloroform	ND	ND	ND	10	9, p. B-58, B-64, D-11
Delta-BHC	ND	ND	ND	0.05	9, p. B-63, B-69, D-15
Diethylphthalate	ND	ND	ND	10	9, p. B-61, B-67, D-13
Di-n-butyl phthalate	ND	ND	ND	10	9, p. B-61, B-67, D-13
Endosulfan I	.0018 J (.018)	ND	ND	.05	9, p. B-63, B-69, D-15
Ethyl benzene	ND	ND	ND	10	9, p. B-58, B-64, D-11
Gamma-BHC (lindane)	ND	ND	ND	0.05	9, p. B-63, B-69, D-15
Lead	19	15.8	50	3	9, p. C-11, C-12, D-16
Manganese	2,480	273	1,520	15	9, p. C-11, C-12, D-16
Naphthalene	ND	ND	ND	10	9, p. B-60, B-66, D-12
Nickel	23.9 B	15.2 B	86.6	40	9, p. C-11, C-12, D-16
Nitrobenzene	ND	ND	ND	10	9, p. B-60, B-66, D-12
Pentachlorophenol	ND	ND	ND	25	9, p. B-61, B-67, D-13
Phenol	ND	ND	ND	10	9, p. B-60, B-66, D-12
Toluene	ND	ND	ND	10	9, p. B-58, B-64, D-11
Xylene (total)	ND	ND	ND	10	9, p. B-58, B-64, D-11

Notes:

J - Estimated value

B- Substance appears in blank

\* Adjusted CRQL/CRDL for substance (Ref. 19).

-Concentrations in bold are the highest background value and were used for comparison with the contaminated samples.

( ) - Concentrations in parentheses are the bias corrected values (Ref. 30).

- Contaminated Samples:

Sample ID	Screened Interval (feet bgs)*	Date	Reference
G 101	20 - 24	5-24-99	14, p. 14, 21
G 102	21 - 23	5-24-99	14, p. 14, 21
G 104	24 - 28	5-26-99	14, p. 14, 21
G 106	16 - 18	5-27-99	14, p. 14, 21
G 107	20 - 24	5-27-99	14, p. 14, 21
G 110	24 - 28	5-26-99	14, p. 15, 22
G 111	16.5 - 18.5	5-24-99	14, p. 15, 22
G 112	18 - 20	5-25-99	14, p. 15, 22
G 113	8 - 12	5-25-99	14, p. 15, 22
G 114	16 - 20	2-25-99	14, p. 15, 22
G 116	17 - 19	5-26-99	14, p. 15, 22
G 117	16 - 20	5-27-99	14, p. 15, 22

\* Elevation in the vicinity of the site varies within 5 feet on either side of the levee and is in the range of 400-410 feet. Therefore, the difference in the elevation of the wells is insignificant with respect to the screened intervals. The levee itself is 12 to 18 feet higher than the surrounding area, however there were no samples taken from the levee (Ref. 3).

- Contaminated samples

Hazardous Substance	Contaminated Samples		Sample Quantitation Limit (µg/L)*	Highest Background Concentration (µg/L)**	References
	Sample ID:	Concentration (µg/L)			
Chloroform	G 104	150 J (15)	200	ND	9, p. B-33; 14, p. 14
1,1,1-Trichloroethane	G 111	11	10	ND	9, p. B-76; 14, p. 15
4-Methyl-2-Pentanone	G 101	18	10	ND	9, p. B-5; 14, p. 14
	G 104	420	200	ND	9, p. B-33; 14, p. 14
Benzene	G 101	30	10	ND	9, p. B-5; 14, p. 14
	G 102	44	10	ND	9, p. B-16; 14, p. 14
	G 104	13,000 D	1000	ND	9, p. B-35; 14, p. 14
	G 113	54	10	ND	9, p. B-91; 14, p. 15
	G 116	58	10	ND	9, p. B-114; 14, p. 15
Toluene	G 104	1000	200	ND	9, p. B-33; 14, p. 14
	G 113	18	10	ND	9, p. B-91; 14, p. 15
Chlorobenzene	G 101	130,000 D	8000	ND	9, p. B-7; 14, p. 14
	G 102	260 D	20	ND	9, p. B-18; 14, p. 14
	G 104	14,000 D	1000	ND	9, p. B-35; 14, p. 14
	G 111	32	10	ND	9, p. B-76; 14, p. 15
	G 112	16	10	ND	9, p. B-82; 14, p. 15
	G 116	73	10	ND	9, p. B-114; 14, p. 15
Ethyl benzene	G 113	140	10	ND	9, p. B-91; 14, p. 15
Xylene (total)	G 113	2000 D	100	ND	9, p. B-93; 14, p. 15
2-Butanone	G 101	12	10	ND	9, p. B-5; 14, p. 14
Phenol	G 104	21,000 D	1	ND	9, p. B-40; 14, p. 14
	G 110	12	10	ND	9, p. B-72; 14, p. 15
2-Chlorophenol	G 101	920 D	10	ND	9, p. B-12; 14, p. 14
	G 104	28,000 D	1	ND	9, p. B-40; 14, p. 14
1,4-Dichlorobenzene	G 102	23	10	ND	9, p. B-20; 14, p. 14
	G 104	1200	100	ND	9, p. B-37; 14, p. 14
	G 112	12	10	ND	9, p. B-84; 14, p. 15
1,2-Dichlorobenzene	G 104	680 J (226.67)	10	19	9, p. B-37; 14, p. 14
4-Methyl phenol	G 104	450 J (45)	1	ND	9, p. B-37; 14, p. 14
Nitrobenzene	G 104	28,000 D	1	ND	9, p. B-40; 14, p. 14

Hazardous Substance	Contaminated Samples		Sample Quantitation Limit (µg/L)*	Highest Background Concentration (µg/L)**	References
	Sample ID:	Concentration (µg/L)			
	G 112	11	10	ND	9, p. B-84; 14, p. 15
2,4-Dichlorophenol	G 104	130,000 D	1	ND	9, p. B-40; 14, p. 14
	G 107	11	10	ND	9, p. B-53; 14, p. 14
	G 113	550 D	0.5	ND	9, p. B-98; 14, p. 15
4-Chloroaniline	G 102	1000 D	125	ND	9, p. B-23; 14, p. 14
	G 104	4500	100	ND	9, p. B-37; 14, p. 14
	G 116	1000 D	1	ND	9, p. B-119; 14, p. 15
2-Methyl naphthalene	G 113	76	10	ND	9, p. B-95; 14, p. 15
2,4,6-Trichlorophenol	G 104	50,000 D	1	ND	9, p. B-40; 14, p. 14
Diethylphthalate	G 113	12	0.05	ND	9, p. B-96; 14, p. 15
4-Nitroaniline	G 104	8500 DJ	2.5	ND	9, p. B-41; 14, p. 14
Pentachlorophenol	G 112	280 D	125	ND	9, p. B-88; 14, p. 15
Di-n-butyl phthalate	G 113	49	0.05	ND	9, p. B-96; 14, p. 15
2,4-Dimethyl phenol	G 113	38	0.05	ND	9, p. B-95; 14, p. 15
Delta-BHC	G 117	.054	0.05	ND	9, p. B-128; 14, p. 15
Aldrin	G 116	.12	0.05	ND	9, p. B-122; 14, p. 15
	G 117	.072	0.05	ND	9, p. B-128; 14, p. 15
Endosulfan I	G 107	.092	0.05	.0018 J (.018)	9, p. B-56; 14, p. 14
4,4'-DDE	G 107	.52	0.1	.015 J (.15)	9, p. B-56; 14, p. 14
4,4'-DDT	G 107	.14	0.1	ND	9, p. B-56; 14, p. 14
Aroclor-1242	G 107	12	0.005	.32 J (3.2)	9, p. B-56; 14, p. 14
Aroclor-1248	G 107	15	0.005	.2 J (2)	9, p. B-56; 14, p. 14
Aroclor-1254	G 107	19	0.005	.55 J (5.5)	9, p. B-56; 14, p. 14
Lead	G 117	238	3	50	9, p. C-20; 14, p. 15
Manganese	G 104	11,800 E	150	2480	9, p. C-8; 14, p. 14
	G 110	8460	15	2480	9, p. C-13; 14, p. 15

Notes:

D - Diluted sample

E - Estimated value, concentrations exceeded the calibration range of the instrument.

J - Estimated value

\* Adjusted CRQL/CRDL for substance (Ref. 19).

\*\* Concentrations are the highest background value and were used for comparison with the contaminated samples.

( ) - Concentrations in parentheses are the bias corrected values (Ref. 30).

### Attribution

Analytical data from samples collected from sources 1-5 document the presence of hazardous substances in the plume and in the source. All the hazardous substances in the observed release by chemical analysis are present in at least one uncontained source at the site. In addition, several of these substances are present in ground water at concentrations significantly above the background concentrations. Other sources at the site are also likely to be in contact with the ground water during events which raise the ground water table.

Sources 1, 2, 3, and 4 were active landfills or sources associated with industrial waste water treatment plants which received waste from the Commercial Acid Company (now called the W. G. Krummrich Plant, a chemical manufacturing facility of Solutia Incorporated) (Refs. 12, p. 1; 14, pp. 1-3). Monsanto has produced a wide variety of chemicals, both organic and inorganic (Ref. 12, p. 1). According to a 1992 RCRA Facility Assessment Report, the following products and wastes have been or are presently generated at the facility: Spent halogenated and non-halogenated solvents, mercury contaminated wastes, chlorobenzenes, nitrochlorobenzenes and benzene compounds, phenols, phosphorus, polychlorinated biphenyl (PCB) compounds, dioxins, aromatic nitro compounds, amines and nitroamines, agent orange, maleic anhydride, acids and caustics (Ref. 12, p. 1). In addition, the landfills contain most of the same hazardous substances which have been found in the release samples in the ground water beneath the landfills. The ground water below the Sauget Area 2 site, appears to be contaminated from sources located on-site. Samples collected from the perimeter of the site do not show elevated levels of contamination like those collected from the main portion of the site (Ref. 14, p. 14).

### Hazardous Substances Released

1,1,1-Trichloroethane	4,4'-DDE	Ethyl benzene
1,2-Dichlorobenzene	4,4'-DDT	Gamma-BHC
1,4-Dichlorobenzene	Aldrin	Lead
2-Butanone	Aroclor-1242	Manganese
2-Chlorophenol	Aroclor-1248	Naphthalene
2-Methyl naphthalene	Aroclor-1254	Nickel
2,4-Dichlorophenol	Benzene	Nitrobenzene
2,4-Dimethyl phenol	Chlorobenzene	Pentachlorophenol
2,4,6-Trichlorophenol	Chloroform	Phenol
4-Chloroaniline	Delta-BHC	Toluene
4-Methyl phenol	Di-n-butyl phthalate	Xylene (total)
4-Methyl-2-Pentanone	Diethylphthalate	
4-Nitroaniline	Endosulfan I	

Ground Water Observed Release Factor Value: 550

#### **4.2.2.1.3 Likelihood of Release**

Ground Water to Surface Water Likelihood of release Factor Category Value: 550

**4.2.2.2 Drinking Water Threat Waste Characteristics**  
Not Scored

**4.2.3.2 Human Food Chain Threat Waste Characteristics**

**4.2.3.2.1 Toxicity/Mobility/Persistence/Bioaccumulation**

Hazardous Substance	Source No.	Toxicity Factor Value	Persistence Factor Value*	Mobility	Toxicity/Persistence/Mobility Factor Value (Table 4-16)	Bio-accumulation Value**	Ref.
1,1,1-Trichloroethane	5, OR	1	.4	1	4	5	2, p. B-19
1,2-Dichlorobenzene	4, OR	10	.4	1	4	50	2, p. B-7
1,2,4-Trichlorobenzene	3, 4	100	.4	1	40	500	2, p. B-19
1,4-Dichlorobenzene	2, OR	10	.4	1	4	50	2, p. B-7
2-Butanone	4, OR	10	.4	1	4	.5	2, p. B-13
2-Chlorophenol	4, OR	100	.4	1	40	500	2, p. B-5
2-Methyl naphthalene	3, 5, OR	NA	.4	1	ND	5000	2, p. B-14
2,4-Dichlorophenol	4, OR	1000	.0007	1	.7	50	2, p. B-8
2,4-Dimethyl phenol	4, OR	100	1	1	100	500	2, p. B-8
2,4,6-Trichlorophenol	4, OR	10	1	1	10	500	2, p. B-20
4-Chloroaniline	2, 3, OR	1000	.07	1	70	5	2, p. B-5
4-Methyl-2-Pentanone	4, 5, OR	100	.4	1	40	5	2, p. B-13
4-Methyl phenol	2, 4, OR	100	.4	1	40	5	2, p. B-6
4-Nitroaniline	4, OR	1	.4	1	.4	5	2, p. B-15
4,4'-DDD	3, 4	100	1	1	100	50,000	2, p. B-6
4,4'-DDE	2, 3, 4, OR	100	1	1	100	50,000	2, p. B-6
4,4'-DDT	3, 5, OR	1000	1	1	1000	50,000	2, p. B-6
Aldrin	2, 4, OR	10,000	1	1	10,000	50,000	2, p. B-1
Alpha-BHC	4	10,000	1	1	10,000	500	2, p. B-12
Aroclor-1016	3	10,000	1	1	10,000	50,000	2, p. B-16
Aroclor-1232	3	10,000	1	1	10,000	50,000	2, p. B-16
Aroclor-1242	2, 3, OR	10,000	1	1	10,000	50,000	2, p. B-16
Aroclor-1248	2, 3, 5, OR	10,000	1	1	10,000	50,000	2, p. B-16
Aroclor-1254	2, 3, 5, OR	10,000	1	1	10,000	50,000	2, p. B-16
Aroclor-1260	3, 5	10,000	1	1	10,000	50,000	2, p. B-16
Barium	3	10,000	1	1	10,000	.5	2, p. B-2
Benzene	2, 3, 4, 5, OR	100	.4	1	40	5000	2, p. B-2

Hazardous Substance	Source No.	Toxicity Factor Value	Persistence Factor Value*	Mobility	Toxicity/Persistence/Mobility Factor Value (Table 4-16)	Bio-accumulation Value**	Ref.
Beryllium	3	10,000	1	1	10,000	50	2, p. B-3
Cadmium	3	10,000	1	1	10,000	5000	2, p. B-4
Chlorobenzene	3, 4, OR	100	.0007	1	.07	50	2, p. B-5
Chloroform	4, 5, OR	100	.4	1	40	5	2, p. B-5
Chromium	2, 3	10,000	1	1	10,000	5	2, p. B-5
Cobalt	3	1	1	1	1	.5	2, p. B-6
Copper	2, 3	NA	.1	1	ND	50,000	2, p. B-6
Delta-BHC	3, 4, OR	1	1	1	1	500	2, p. B-12
Di-n-butyl phthalate	5, OR	10	1	1	10	5000	2, p. B-7
Dieldrin	5	10,000	1	1	10,000	50,000	2, p. B-8
Endosulfan II	2, 3, 5	100	1	1	100	500	2, p. B-9
Endosulfan I	2, 3, 4, 5, OR	100	1	1	100	500	2, p. B-9
Endosulfan sulfate	3, 5	100	1	1	100	500	2, p. B-9
Endrin	3, 5	10,000	1	1	10,000	5000	2, p. B-10
Endrin aldehyde	3, 5	NA	.4	1	ND	500	2, p. B-10
Ethyl benzene	2, 3, 4, 5, OR	10	.4	1	4	50	2, p. B-10
Gamma-BHC	3	10,000	1	1	10,000	500	2, p. B-13
Gamma-chlordane	3, 4, 5	10	1	1	10	50,000	2, p. B-4
Heptachlor epoxide	3, 4	10,000	1	1	10,000	5	2, p. B-11
Heptachlor	3, 4	1000	1	1	1000	5000	2, p. B-11
Lead	2, 3, OR	10,000	1	1	10,000	50	2, p. B-13
Manganese	1, 3, OR	10,000	1	1	10,000	.5	2, p. B-13
Naphthalene	3, 5, OR	100	.4	1	40	500	2, p. B-14
Nickel	2, 3	10,000	1	1	10,000	.5	2, p. B-14
Nitrobenzene	4, OR	1000	1	1	1000	5	2, p. B-15
Pentachlorophenol	3, 4, OR	100	1	1	100	500	2, p. B-16
Phenol	2, 3, 4, OR	1	1	1	1	5	2, p. B-16
Toluene	2, 3, 4, 5, OR	10	.4	1	4	50	2, p. B-19
Trichloroethene	5	10	.4	1	4	50	2, p. B-19
Vanadium	1, 2, 3	100	1	1	100	.5	2, p. B-20
Xylene (total)	2, 3, 4, 5, OR	1	.4	1	.4	50	2, p. B-20



Hazardous Substance	Source No.	Toxicity Factor Value	Persistence Factor Value*	Mobility	Toxicity/Persistence/Mobility Factor Value (Table 4-16)	Bio-accumulation Value**	Ref.
Zinc	2, 3, OR	10	1	1	10	500	2, p. B-20

Notes:

The mobility factor is 1 because of the observed release by chemical analysis.

\* Persistence value for Rivers

\*\* Bioaccumulation factor value for freshwater

The hazardous substances with the highest Toxicity/Mobility/Persistence/Bioaccumulation value are:

Aldrin

Aroclor-1016

Aroclor-1232

Aroclor-1242

Aroclor-1248

Aroclor-1254

Aroclor-1260

Dieldrin

Toxicity/Mobility/Persistence/Bioaccumulation Factor Value:  $5 \times 10^8$

#### 4.2.3.2.2 Hazardous Waste Quantity

Source No.	Source Type	Source Hazardous Waste Quantity
1 (O)	Surface Impoundment	75,343.75
2 (P)	Landfill	366.17
3 (Q)	Landfill	2883.9
4 (R)	Landfill	317.12
5 (S)	Landfill	137.86

Sum of Values: 79,048.8

Hazardous Waste Quantity Factor Value: 10,000  
(Ref. 1, Table 2-6)

#### 4.2.3.2.3 Waste Characteristics Factor Category Value

Toxicity/Mobility/Persistence Factor Value: 10,000  
Hazardous Waste Quantity Factor Value: 10,000  
Bioaccumulation value: 50,000

Toxicity/Mobility/Persistence Factor Value x Hazardous Waste Quantity Factor Value:  $1 \times 10^8$   
( $10,000 \times 10,000 = 1 \times 10^8$ )  
(max  $1 \times 10^8$ )

Bioaccumulation potential factor value x  
(Toxicity/Persistence Factor Value x Hazardous Waste Quantity Factor Value) :  $1 \times 10^{12}$   
( $50,000 \times 1 \times 10^8 = 5 \times 10^{12}$ )  
(Max  $1 \times 10^{12}$ )

Waste Characteristics Factor Category Value: 1,000  
(Ref. 1, Table 2-7)

#### 4.2.3.3 Human Food Chain Threat Targets

##### Actual Human Food Chain Contamination

Actual contamination can be established for the portion of the fishery located between the northern most boundary of the site and the southern most boundary of the site along the river (figure 1). The hazardous substances released during the 1993 flood are listed previously in section 4.1.2.1.1 of this document. PPEs for sources 3 and 4 are the entire shoreline between the most northern boundary of source 4 to the most southern boundary of source 3. The remaining sources' (1, 2, and 5) PPEs are located along the same shoreline in a straight line, directly from the respective source. Since these multiple PPEs would fall within the PPEs of sources 3 and 4, only the most northern and southern PPEs are displayed (Ref. 3, map 1).

##### Level I Concentrations

No level I concentrations have been identified for the Human Food Chain Threat.

##### Most Distant Level II Sample

Sample ID: SD-7-150

Distance from the PPE: Sample located approximately 2000 feet downstream from uppermost PPE

Reference: 23, pp. 4, 1-18, 1-19

##### Level II Fisheries

Identity of Fishery	Extent of Level II Fishery (Relative to PPE)	Refs.
Mississippi River	2,000 feet	3, map 1; 28

#### 4.2.3.3.1 Food Chain Individual

Level I/Level II/or potential: Level II

Hazardous Substance: PCBs

Bioaccumulation Potential: 50,000

Identity of fishery	Type of surface water	Dilution Weight (table 4-13)	Refs.
Mississippi River	Very Large River	0.00001	27; 28; figure 1

Food Chain Individual Factor Value: 45

(Ref. 1, sec. 4.1.3.3.1)

#### 4.2.3.3.2 Population

The Sauget Area 2 site is located along the Illinois bank of the Mississippi River at river mile 178 (Ref. 3, p. 1).

Although the entire river is fished, the river adjacent to and immediately downstream of the site is mostly bank fished. Many species exist within the river, however, the most popular are Catfish, Drum and Carp (Ref. 28, p. 1).

While it is known that the area is used as a fishery, the exact number of fish caught every year is unknown (Ref. 28, p. 1). Therefore, > 0 has been assigned to the Annual Production category for scoring purposes.

##### 4.2.3.3.2.2 Level II Concentrations

Identity of fishery	Annual Production (Pounds)	Refs.	Human Food Chain Population Value (Table 4-18)
Mississippi River	> 0	28	0.03

Level II Concentrations Factor Value : 0.03

#### 4.2.4.2 Environmental Threat Waste Characteristics

##### 4.2.4.2.1 Ecosystem Toxicity/Mobility / Persistence/Bioaccumulation

Hazardous Substance	Source No.	Ecosystem Toxicity Factor Value	Persistence Factor Value*	Mobility	Ecosystem Toxicity/ Persistence Factor Value (Table 4-21)	Bio-accumulation Value**	Ref.
1,1,1-Trichloroethane	5, OR	10	.4	1	4	5	2, p. B-19
1,2-Dichlorobenzene	4, OR	100	.4	1	40	50	2, p. B-7
1,2,4-Trichlorobenzene	3, 4	1000	.4	1	400	500	2, p. B-19
1,4-Dichlorobenzene	2, 4, OR	100	.4	1	40	50	2, p. B-7
2-Butanone	4, OR	1	.4	1	.4	.5	2, p. B-13
2-Chlorophenol	4, OR	100	.4	1	40	500	2, p. B-5
2-Methyl naphthalene	3, 5, OR	1000	.4	1	400	5000	2, p. B-14
2,4-Dichlorophenol	4, OR	100	.0007	1	.07	500	2, p. B-8
2,4-Dimethyl phenol	4, OR	100	1	1	100	500	2, p. B-8
2,4,6-Trichlorophenol	4, OR	1000	1	1	1000	50,000	2, p. B-20
4-Chloroaniline	2, 3, 4, OR	10,000	.07	1	700	5	2, p. B-5
4-Methyl-2-Pentanone	4, 5, OR	1	.4	1	.4	5	2, p. B-13
4-Methyl phenol	2, 4, OR	NA	.4	1	ND	5	2, p. B-6
4-Nitroaniline	4, OR	1	.4	1	.4	5	2, p. B-15
4,4'-DDD	3, 4	10,000	1	1	10,000	50,000	2, p. B-6
4,4'-DDE	2, 3, 4, OR	10,000	1	1	10,000	50,000	2, p. B-6
4,4'-DDT	3, 5, OR	10,000	1	1	10,000	50,000	2, p. B-6
Aldrin	2, 4, OR	10,000	1	1	10,000	50,000	2, p. B-1
Alpha-BHC	4	100	1	1	100	500	2, p. B-12
Aroclor-1016	3	10,000	1	1	10,000	50,000	2, p. B-16
Aroclor-1232	3	10,000	1	1	10,000	50,000	2, p. B-16
Aroclor-1242	2, 3, OR	10,000	1	1	10,000	50,000	2, p. B-16
Aroclor-1248	2, 3, 5, OR	10,000	1	1	10,000	50,000	2, p. B-16
Aroclor-1254	2, 3, 5, OR	10,000	1	1	10,000	50,000	2, p. B-16
Aroclor-1260	3, 5	10,000	1	1	10,000	50,000	2, p. B-16
Barium	3	1	1	1	1	.5	2, p. B-2
Benzene	2, 3, 4, 5, OR	100	.4	1	40	500	2, p. B-2
Beryllium	3	NA	1	1	ND	50	2, p. B-3
Beta-BHC	5	NA	1	1	ND	500	2, p. B-12

Hazardous Substance	Source No.	Ecosystem Toxicity Factor Value	Persistence Factor Value*	Mobility	Ecosystem Toxicity/Persistence Factor Value (Table 4-21)	Bio-accumulation Value**	Ref.
Cadmium	3	1000	1	1	1000	5000	2, p. B-4
Chlorobenzene	3, 4, OR	1000	.0007	1	.7	50	2, p. B-5
Chloroform	4, 5, OR	10	.4	1	4	5	2, p. B-5
Chromium	2, 3	100	1	1	100	5	2, p. B-5
Cobalt	3	NA	1	1	ND	5000	2, p. B-6
Copper	2, 3	100	1	1	100	50,000	2, p. B-6
Delta-BHC	3, 4, OR	NA	1	1	ND	500	2, p. B-12
Di-n-butyl phthalate	5, OR	1000	1	1	1000	5000	2, p. B-7
Dieldrin	5	10,000	1	1	10,000	50,000	2, p. B-8
Endosulfan II	2, 3, 5	10,000	1	1	10,000	50,000	2, p. B-10
Endosulfan I	2, 3, 4, 5, OR	10,000	1	1	10,000	50,000	2, p. B-10
Endosulfan sulfate	3, 5	NA	1	1	ND	500	2, p. B-9
Endrin	3, 5	10,000	1	1	10,000	50,000	2, p. B-10
Endrin aldehyde	3, 5	NA	.4	1	ND	500	2, p. B-10
Ethyl benzene	2, 3, 4, 5, OR	100	.4	1	40	50	2, p. B-10
Gamma-BHC	3	10,000	1	1	10,000	500	2, p. B-13
Gamma-chlordane	3, 4, 5	10,000	1	1	10,000	500	2, p. B-4
Heptachlor epoxide	3, 4	10,000	1	1	10,000	50,000	2, p. B-11
Heptachlor	3	10,000	1	1	10,000	50,000	2, p. B-11
Lead	2, 3, OR	1000	1	1	1000	5000	2, p. B-13
Manganese	1, 3, OR	NA	1	1	ND	50,000	2, p. B-13
Naphthalene	3, 5, OR	1000	.4	1	400	500	2, p. B-14
Nickel	2, 3	10	1	1	10	500	2, p. B-14
Nitrobenzene	4, OR	100	1	1	100	5	2, p. B-15
Pentachlorophenol	3, 4, OR	100	1	1	100	5000	2, p. B-16
Phenol	2, 3, 4, OR	10,000	1	1	10,000	5	2, p. B-16
Toluene	2, 3, 4, 5, OR	100	.4	1	40	50	2, p. B-19
Trichloroethene	5	100	.4	1	40	50	2, p. B-19
Vanadium	1, 2, 3	NA	1	1	ND	.5	2, p. B-20
Xylene (total)	2, 3, 4, 5, OR	100	.4	1	40	50	2, p. B-20
Zinc	2, 3, OR	10	1	1	10	500	2, p. B-20

Notes:

- \* Persistence value for Rivers
- \*\* Environmental Bioaccumulation factor value for freshwater

The substances which document the highest Ecosystem Toxicity/Mobility/Persistence/Bioaccumulation value include:

4,4'-DDD	Aroclor-1242	Endosulfan II
4,4'-DDE	Aroclor-1248	Endosulfan I
4,4'-DDT	Aroclor-1254	Endrin
Aldrin	Aroclor-1260	Heptachlor epoxide
Aroclor-1016	Dieldrin	Heptachlor
Aroclor-1232		

Ecosystem Toxicity/Mobility/Persistence/Bioaccumulation Factor Value:  $5 \times 10^8$   
(Ref. 1, Table 4-30)

#### 4.2.4.2.2 Hazardous Waste Quantity

Source No.	Source Type	Source Hazardous Waste Quantity
1 (O)	Surface Impoundment	75,343.75
2 (P)	Landfill	366.17
3 (Q)	Landfill	2883.9
4 (R)	Landfill	317.12
5 (S)	Landfill	137.86

Sum of Values: 79,048.8

Hazardous Waste Quantity Factor Value: 10,000  
(Ref. 1, Table 2-6)

#### 4.2.4.2.3 Waste Characteristics Factor Category Value

Ecosystem Toxicity/Persistence/ Mobility Factor Value: 10,000  
Hazardous Waste Quantity Factor Value: 10,000  
Bioaccumulation value: 50,000

Ecosystem Toxicity/Persistence Factor Value x Hazardous Waste Quantity Factor Value:  $1 \times 10^8$   
( $10,000 \times 10,000 = 1 \times 10^8$ )  
(max  $1 \times 10^8$ )

Ecosystem Bioaccumulation potential factor value x  
(Ecosystem Toxicity/Persistence Factor Value x Hazardous Waste Quantity Factor Value) :  $1 \times 10^{12}$   
( $50,000 \times 1 \times 10^8 = 5 \times 10^{12}$ )  
(Max  $1 \times 10^{12}$ )

Waste Characteristics Factor Category Value: 1,000  
(Ref. 1, Table 2-7)

#### 4.2.4.3 Environmental Threat Targets

Environmental targets include sensitive habitats for six threatened or endangered species of birds and wetlands located within source 4. These species were identified by the Illinois Department of Natural Resources as nesting or foraging within the Sauget Area 2 site (Ref. 15, p. 2). The Palustrine wetlands were identified by the Illinois Department of Conservation (Ref. 20, p. 14). The wetlands in Source 3 contain vegetation consistent with that found in wetlands of this type, such as the Eastern Cottonwood, Black Willow, Water Plantain and Potamogeton nodosus (Ref. 20, p. 5, 14, 15, 20).

#### Most Distant Level II Sample

Sample ID: SD-7-150

Distance from the PPE: Sample located approximately 2000 feet downstream from uppermost PPE

Reference: 23, pp. 4, 1-18, 1-19

#### 4.2.4.3.1 Sensitive Environments

##### 4.2.4.3.1.1 Level I Contamination.

No level I concentrations have been identified for the Environmental Threat.

##### 4.2.4.3.1.2 Level II Concentrations

#### Sensitive environments

Type of Surface Water Body	Sensitive Environment	References	Sensitive Environment Value (Table 4-23)
Very Large River	Bald Eagle Habitat	15, p. 2; 29, p. 1	75 - Federal threatened
Very Large River	Common Moorhen Habitat	15, p. 2; 29, p. 5	50 - State threatened
Very Large River	Black-crowned Night Heron Habitat	15, p. 2; 29, p. 6	50 - State endangered
Very Large River	Snowy Egret Habitat	15, p. 2; 29, p. 6	50 - State endangered
Very Large River	Little Blue Heron Habitat	15, p. 2; 29, p. 6	50 - State endangered
Very Large River	Yellow-crowned Night Heron Habitat	15, p. 2; 29, p. 6	50 - State endangered

Sum of Level II Sensitive Environments Value: 325

#### Wetlands

While the wetland presently has been impacted by removal actions and a dry period, this area, under normal conditions, contains vegetation and soil types consistent with those of a wetland (Ref. 20, p. 14).

Type of Surface Water Body	Wetland Frontage (miles)	References	Wetlands Value (Table 4-24)
Wetland adjacent to Large River	3.2 mi*	Figure 1; 20, p. 14	100

\* This number was determined by measuring the perimeter of the wetland located in Source 3 (Figure 1). Most of the Source contains soils that have been classified as those found in wetlands (Ref. 1, Section 4.1 4.3.1.2; 20, p. 14, 15).

Sum of Sensitive environments and wetlands value: 425